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Essays at the intersection of taxation and financial accounting

Rodney John Brown

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Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

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Statement of conjoint work

I confirm that Chapter 1 was jointly co-authored with Professor Chris Evans and Dr Youngdeok Lim (both at the University of New South Wales) and I contributed 80% of this work.

I confirm that Chapter 3 was jointly co-authored with Professor Bjorn Jorgensen and Professor Peter Pope (both at the London School of Economics and Political Science) and I contributed 80% of this work.

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Abstract

This thesis consists of three separate chapters that explore issues at the intersection of taxation and financial accounting. The unifying theme is corporate tax avoidance and the consequences of increased transparency of tax practices on firm behaviour and financial reporting.

Chapter 1 (co-authored with Chris Evans and Youngdeok Lim) examines the impact of changes to a full dividend imputation system on corporate tax avoidance. We exploit an exogenous shock to the Australian dividend imputation system which became effective on 1 July 2000 and allows shareholders to claim *all* imputation credits attached to dividends, even if it propels them into a tax refund position. This enhancement to shareholder's after-tax positions likely provides stronger incentives for firms to minimise tax avoidance activities to generate valuable imputation credits for distribution to shareholders. We implement a difference-in-differences research design to examine the impact of the legislative change on tax avoidance for a variety of treatment and control groups after the change. Consistent with our expectations, we find evidence of an increase in cash effective tax rates (decrease in tax avoidance) for domestic dividend-paying firms relative to domestic non-dividend-paying firms. This finding is even more pronounced for firms paying fully-franked dividends, and the decreases in tax avoidance are economically significant. Our results are consistent with the notion that firms undertake less tax avoidance in the post 1 July 2000 period given the presence of stronger incentives for them to pay corporate tax.

In Chapter 2 (solo-authored), I exploit the availability of new data to examine the impact of mandatory public country-by-country disclosures on the tax aggressiveness of European Union (EU) banks. In response to growing public and political backlash against tax avoidance, the European Parliament introduced new rules in 2013 requiring the *public* disclosure, on a *country-by-country* basis, of certain tax-related information by credit and investment firms operating in the EU. Enhanced transparency via public country-by-country-reporting (CBCR) allows greater scrutiny by stakeholders and is considered one way of increasing pressure on EU banks to pay corporate taxes that reflect their true economic presence in each country they operate in. I conduct a range of empirical tests using cash and book effective tax rates to proxy for tax avoidance

and based on a hand-collected sample of 72 banks, I do not find any evidence of a reduction in tax avoidance in response to increased transparency. A similar result is found when a differences-in-differences research design is employed to test for any change in tax avoidance of EU banks relative to a control group of 39 multinational EU insurers exempt from CBCR rules. In fact, in some tests, I find that, on average, EU banks *increased* their tax avoidance relative to EU insurers despite increased disclosure levels. I also find that tax haven use, calculated as the proportion of turnover, profit before tax, and subsidiaries/branches disclosed in tax havens, remains largely unchanged despite increased transparency. The results suggest that mandatory public CBCR has not altered the cost-benefit equilibrium of tax avoidance sufficiently to encourage EU banks to curtail their tax avoidance practices.

Chapter 3 (co-authored with Bjorn Jorgensen and Peter Pope) investigates the interplay between mandatory public CBCR, geographic segment reporting, and tax haven use. We examine whether the availability of country-level financial information impacts geographic segment reporting and the extent to which firms aggregate geographic segments. Based on a hand-collected sample of 70 banks operating in the EU, we document the location of their operations and the extent to which they operate in tax havens. We find that, on average, banks with tax haven operations enjoy significantly higher profit margins, turnover per employee, and profit per employee, and lower book effective tax rates, in these jurisdictions relative to non-tax havens. Using a difference-in-differences research design, we find no significant change in the number of geographic segments, country segments, or line items per geographic segment, disclosed in segment reporting notes after the introduction of CBCR relative to a control sample of 39 multinational EU insurers exempt from CBCR. Furthermore, we find a positive association between tax haven intensity and geographic segment aggregation consistent with the notion that EU banks may aggregate geographic segments to obfuscate tax haven activities. This early empirical evidence suggests that mandatory public CBCR has limited impact on geographic segment reporting.

In sum, the three chapters of this thesis contribute to the emerging literature on the determinants and consequences of corporate tax avoidance. The findings should inform global regulators and policy makers interested in the extent of corporate tax avoidance and especially, EU policy makers currently considering the extension of public CBCR to all industries.

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Chapter 1

The impact of a change in a full dividend imputation system on corporate tax avoidance

1.1 Introduction

We examine whether the level of tax avoidance undertaken by firms operating in a full dividend imputation system decreases when changes made to the system enhance shareholders' after-tax returns.[1] We focus on Australian publicly-listed firms because Australia is one of a few countries who continue to operate a full dividend imputation system, thereby providing a high-power setting for studying the impacts of dividend imputation.[2] Prior studies suggest that dividend imputation is associated with lower levels of tax avoidance (Wilkinson et al. 2001; Ikin and Tran 2013; McClure et al. 2018). The objective of this chapter is to extend these findings by exploiting a *change* to Australia's full dividend imputation system to provide cleaner identification of the relation between dividend imputation and tax avoidance.[3] Specifically, we exploit an exogenous shock where new rules allow shareholders to claim *all* imputation credits attached to dividends. We argue that this enhancement to shareholder's after-tax positions provides *stronger* incentives for some firms to pay corporate taxes (minimise tax avoidance) to generate additional valuable imputation credits for distribution to shareholders. Employing a difference-in-differences research design, we test our hypothesis by examining the impact on tax avoidance for different groups of firms before and after this new legislation became effective on 1 July 2000.

[1] Importantly, from a legal perspective *tax evasion*, *tax avoidance* and *tax minimisation* are clearly distinct as they involve varying degrees of intent. Tax avoidance, sometimes referred to as 'aggressive tax planning', involves activities that are within the 'letter of the law' but contrary to the 'spirit of the law' and usually involves the aggressive exploitation of tax law loopholes. However, to avoid the complexity of determining the legality or appropriateness of the particular mechanism used to reduce the firm's tax liability, we follow the literature (e.g., Frank et al. 2009; Cheng et al. 2012) and define tax avoidance as per Hanlon and Heitzman (2010) as all activities specifically undertaken that have the effect of reducing a firm's overall cash taxes.

[2] Chile, Malta, Mexico, and New Zealand operate full dividend imputation systems (Ainsworth 2016).

[3] Tax avoidance and dividend policy decisions are jointly determined in equilibrium. Therefore, to mitigate concerns regarding endogeneity, we exploit the quasi-experimental setting offered by the *change* in Australia's dividend imputation system.

Accusations of tax avoidance have thrust many publicly-listed companies into the spotlight in recent years. Downwards management of tax liabilities by multinational corporations (MNCs) such as Apple, Starbucks and Google, has met with condemnation from the press, public interest groups, politicians and global organisations such as the G20 and OECD, who express concern that these firms do not pay their 'fair share' of tax. The Tax Justice Network and United Voice (2014) accuses Australian listed companies of tax avoidance on an industrial scale claiming that the federal government is short-changed by A$8.4 billion annually in corporate tax revenue. The heightened interest from policy makers in recent years is due to the perceived inequities surrounding questionable tax practices coupled with governments' desire to preserve tax system integrity and safeguard revenue against the global economic backdrop of unprecedented fiscal imbalances.

Over the past decade, a rapidly evolving academic literature has emerged on tax avoidance in an attempt to understand the practices used by companies to minimise their tax liabilities and the consequences thereof. These studies document a variety of determinants of corporate tax avoidance and an assortment of financial reporting, capital market, and contracting outcomes associated with such activities.[4] Although considered by many as morally questionable, tax avoidance practices can lead to increases in both accounting earnings and cash flows. Furthermore, some managers believe that their fiduciary duty to shareholders compels them to act aggressively with respect to tax strategy if it leads to significant cost savings and increased firm value. However, frictions such as tax planning costs, management rent extraction, reputational effects, and post-audit penalties, may provide a counterweight to such incentives.[5] Indeed, Chen et al. (2010) and Chyz et al. (2013) provide evidence that company stakeholders view tax avoidance negatively and seek to limit these activities. Thus, managers face a delicate risk-reward trade-off between personal incentives, prospective shareholder benefits, stakeholder expectations, and risk.[6]

[4] See Graham et al. (2012) and Hanlon and Heitzman (2010) for reviews of the extant tax research in accounting and economics.

[5] Corporate tax avoidance may increase information risk (Balakrishnan et al. 2018), agency risk (Desai and Dharmapala 2006), the risk of being audited by tax authorities (Mills 1998), and overall firm risk (Guenther et al. 2017).

[6] A new interpretation of tax avoidance emerges from Blouin (2014) and Armstrong et al. (2015) who consider it to be a form of investment similar to other investment opportunities available to the firm. Accordingly, before the firm chooses to invest, it evaluates the net present value of the 'project' which is a function of both the expected cash flows and the inherent risk (i.e., the dispersion of the potential

We argue that in Australia, the full dividend imputation system provides a strong countervailing influence on the incentives managers of certain firms may have to engage in tax avoidance. This system eliminates the double taxation on distributed profits between companies and shareholders. It achieves this by allowing the tax paid by a company to be credited, or imputed, to the shareholders by way of a franking credit attached to dividends to reduce the final income tax payable by the shareholder.[7] Consequently, the imputation system likely leads to heterogeneity in tax avoidance incentives across Australian publicly-listed firms due to differences in dividend pay-out policy. Australian firms that pay dividends with attached franking credits are more likely to face stronger incentives to pay corporate tax relative to foreign firms publicly-listed in Australia, Australian firms that do not pay dividends, or Australian firms that pay unfranked dividends.[8] Importantly, this heterogeneity facilitates comparisons between these different groups operating with the same system.

We exploit a plausibly exogenous shock that occurred in late 1999 whereby legislation ('rebate provision') was passed allowing Australian resident shareholders to claim all franking credits attached to dividends they receive. That is, contrary to the prior rules which only allowed shareholders to utilise the credits up to the point where they offset their tax liability, the new rules allow taxpayers to claim *all* franking credits, even if it puts them into a tax refund position. Effective 1 July 2000, this rule change increased the value and demand for franking credits by shareholders. We test our hypotheses by examining tax avoidance, measured using cash effective tax rates (ETRs), before and after this exogenous shock.[9] Exploiting a change in shareholder dividend tax rules that does not affect financial reporting helps us to isolate the impact of the change on tax avoidance.

Consistent with our hypotheses, we find that over the sample period (1997-2004), cash ETRs are significantly *higher* for (i) Australian (domestic) dividend-paying firms

cash flows). Therefore, they argue that tax aggressiveness and tax risk are not separable concepts. Guenther et al. (2017) find that tax risk, measured as the volatility of the cash effective tax rate (ETR), is positively related to future total firm risk.

[7] The terms 'franking credit' and 'imputation credit' are equivalent and used interchangeably throughout the chapter to describe the tax credit attached to dividends.

[8] Details of the mechanics of the dividend imputation system including discussion of franked and unfranked dividends are discussed in more detail in Section 1.2 below.

[9] As a note of caution, we do not infer or imply that firms in our sample with low cash ETRs have achieved those low rates through illegal or improper means, but rather that they are able to report and pay a lower percentage of their earnings through cash taxes.

relative to foreign firms publicly-listed in Australia; (ii) domestic dividend-paying firms relative to domestic non-dividend-paying firms, and (iii) domestic firms paying fully-franked dividends relative to domestic dividend-paying firms that do not pay fully-franked dividends. Next, we find evidence of a reduction in tax avoidance after the introduction of the rebate provision on 1 July 2000. Specifically, univariate tests reveal that cash ETRs for domestic dividend-paying firms are significantly *higher* in the period after the rule change. Then, utilising a difference-in-differences research design, we find that dividend-paying domestic firms report significantly *higher* cash ETRs following the change, indicating a *decrease* in tax avoidance relative to non-dividend-paying domestic firms. A similar result is found when comparing fully-franked dividend-paying domestic firms to non-fully-franked dividend-paying domestic firms. Our estimates suggest the decreases in tax avoidance are economically significant with additional cash taxes paid ranging from approximately A$7.89m to A$23.27m. Surprisingly, although domestic firms have significantly higher cash ETRs after the change while foreign firms publicly-listed in Australia do not, we fail to find a significant decrease in tax avoidance for domestic firms relative to foreign firms after the change. However, this is likely due to the small number of foreign firms in the control sample reducing the statistical power in empirical tests.

Our findings have academic contribution and policy implications. From an academic standpoint, this study contributes to the extant literature in several ways. First, we extend the findings in recent studies (e.g., Ikin and Tran 2013; Amiram et al. 2017; and McClure et al. 2018) by exploiting an important exogenous shock to Australia's full dividend imputation system to better identify the relation between this system and the level of tax avoidance undertaken by Australian publicly-listed firms. Second, corporate tax avoidance in Australia has only become a topic of academic study in recent years.[10] Thus, this study adds to this emerging literature, in particular, the incentives Australian managers face to engage in tax avoidance and the role that dividend imputation plays in curtailing such activities.

[10] Recent studies investigate the relationship between tax aggressiveness and: board composition (Lanis and Richardson 2011; Richardson et al. 2013a); corporate social responsibility (Lanis and Richardson 2012, 2013, 2015); incentives for corporate tax planning and reporting (Taylor and Richardson 2014); the determinants of transfer pricing aggressiveness (Richardson et al. 2013b) and thinly capitalised tax avoidance structures (Taylor and Richardson 2013); the international tax avoidance practices of publicly-listed Australian firms (Taylor and Richardson 2012); and the determinants of the variability in corporate effective tax rates and tax reform (Richardson and Lanis 2007).

From a policy perspective, our findings advance the understanding of corporate tax avoidance in Australia and may assist in designing future policy. Australia's budget is more dependent on corporate tax than all other OECD countries except Norway (OECD 2014a);[11] and after personal income tax, corporate tax is the second largest source of federal government revenue (Australian Department of Treasury 2014). Hence, understanding the underlying motives for tax avoidance can help legislators design a more efficient corporate tax system. Finally, this study also has a particular significance and relevance since Australia recently considered a move away from its full dividend imputation system. This was discussed in the Commonwealth Government Tax Discussion Paper released in March 2015 which formally started the process for developing the White Paper on the 'Reform of Australia's Tax System'.[12] Although the development of the White Paper has ceased, the debate about the efficacy of the full dividend imputation system will likely re-emerge in the near future.[13] Therefore, our findings provide empirical evidence of the extent to which the current full dividend imputation system helps mitigate corporate tax avoidance activity.

1.2 Literature review and hypothesis development

Upon receipt, shareholders pay tax on a dividend at their marginal tax rate with any final liability dependent on whether the payer's resident country employs a 'dividend imputation' or 'classical' system. In a dividend imputation system, the tax paid by a company may be imputed to the shareholders by way of a tax credit (franking credit) to reduce the subsequent tax payable on the dividend received. A full dividend imputation system allows shareholders a credit for the *entire* tax paid by the company whereas a partial imputation system does not.[14] In contrast, a 'classical' system

[11] In 2013, Australia's company tax revenue as a proportion of GDP was 4.9% compared to the OECD average of 2.9% (OECD 2014a).

[12] The Tax Discussion Paper provides a broad overview of the need to respond to challenges such as globalisation, declining productivity, and an ageing population. It mentions several tax-related challenges that may need to be addressed including drawbacks of the full dividend imputation system (Australian Commonwealth Government 2015). Unlike the extensive 2009 Henry Review (Australian Commonwealth Treasury - AFTS Secretariat 2009) which provided detailed recommendations, the Tax Discussion Paper provides few pointers as to the breadth of any future reform package.

[13] In February 2016 the Prime Minister, Malcom Turnbull, stated that the 2016-2017 Federal Budget released in May 2016 was 'for all practical purposes, the White Paper'.

[14] Australia replaced its classical system with a full dividend imputation system from 1 July 1987. Finland, France, Germany, Italy and Norway eliminated their full imputation systems between 1999 and 2007 in response to a European Court of Justice ruling that the imputation systems of several European countries were discriminatory and in violation of EU law. The US operates a 'modified

effectively results in double taxation of corporate income (i.e., income is taxed first at the company level and again at the shareholder level). Panel A of Appendix A provides an illustrative example of the after-tax cash flows available to shareholders under both regimes.

Essentially, under an imputation system, corporate tax paid by a company is a prepayment of shareholders' personal tax and is not a real cost as in a classical system. Managers therefore have reduced incentives to undertake aggressive tax planning.[15] Indeed, Ikin and Tran (2013) investigate large publicly-listed Australian firms in the 1999-2003 period and find that firms distributing franked dividends adopt a more conservative tax strategy (measured using book ETRs) compared to firms that do not pay franked dividends. However, the authors do not attempt to exploit any of the changes to the imputation system that occurred during this period. More recently, McClure et al. (2018) find that the impact of dividend imputation on tax avoidance varies across Australian publicly-listed firms. Specifically, they find that firms paying partly-franked or fully-franked dividends, are less likely to engage in tax avoidance compared to firms that pay unfranked dividends or firms that pay no dividends at all. The authors deliberately chose the sample period as 2004-2015 for stability thereby avoiding changes to the dividend imputation system made before 2004.

Most importantly, from 1 July 2000, franking credits in Australia became *fully refundable* meaning that not only can they reduce a shareholder's tax liability to zero, but any excess is refunded to the shareholder.[16] The illustrative example in Panel B of Appendix A demonstrates the impact of this change on shareholder-level tax liabilities for different types of resident shareholders with varying marginal tax rates.[17] Clearly, the change is especially attractive to resident taxpayers whose marginal tax rate is less than the statutory company tax rate of 30% (Investors 1 and 2 in Panel B

classical' system (dividend income taxed at preferential rates (e.g., compared to interest income) at the shareholder level) (OECD 2014b; Ainsworth 2016).

[15] This most likely relates to domestic tax avoidance because Australia, like most countries, with the major exception of the US, adopts a 'territorial approach' to the taxation of MNC income where it only taxes the profits earned within its borders (i.e., source basis). Profits earned overseas are taxed by foreign tax authorities which reduces the amount of Australian corporate tax paid and thus the amount of franking credits available. The US adopts a 'worldwide' taxation system in which it taxes the worldwide income of its MNCs (i.e., residency basis).

[16] Under section 67-25(1) of the *Income Tax Assessment Act (ITAA) 1997*, if the tax offset allowed for franking credits exceeds the tax payable by the shareholder, the excess franking credit is fully refundable to the taxpayer.

[17] Only Australian resident shareholders can utilise franking credits.

of Appendix A). Therefore, key beneficiaries of the change include Australian superannuation funds in pension mode (post-retirement phase) whose earnings are taxed at 0%, and superannuation funds in accumulation mode (pre-retirement phase) who are taxed at 15%. Indeed, Mackenzie and McKerchar (2014) interviewed Chief Investment Officers of 22 Australian superannuation funds and found that 71% claim to actively manage franking credits as part of their overall investment strategy. Notably, superannuation funds are major investors in Australian listed companies representing approximately 21% of total market capitalisation.[18]

Several additional changes were made to the Australian dividend imputation system in the years surrounding the introduction of the rebate provision potentially creating confounding effects. For example, from 1 July 1997, the 45-day holding rule requires resident taxpayers to continuously hold shares at risk for at least 45 days to be eligible to receive franking credits. Other enhancements effective 1 July 2002 provided greater flexibility in the availability of franking credits and simplified the interaction of the imputation system with tax loss regulations. However, the rebate provision effective 1 July 2000 arguably had a much *greater* impact for shareholders. Supporting this contention is the finding of Beggs and Skeels (2006) who show that franking credits had no value until 1 July 2000, after which franking credits were estimated to be worth 57% of their face value. Similarly, Cummings and Frino (2008) find that franking credits are worth at least 50% of their face value during the period 2002-2005. Jun et al. (2011) propose that in combination, the results of these two studies suggest that the year 2000 tax change significantly *increased* the value of franking credits to the marginal investor in the Australian market. Accordingly, we employ this change as the treatment effect in our empirical analysis.

In their review of the financial implications of dividend imputation, Ainsworth et al. (2015) acknowledge that, at the margin, the imputation system creates a bias to Australian equities amongst domestic investors.[19] Therefore, from a shareholder

[18] As at 30 June 2013, public superannuation funds have direct holdings in Australian listed companies worth AU$123,462m (APRA 2015), while self-managed (private) superannuation funds own AU$156,363m (ATO 2015). The total of AU$279,825m equates to 20.8% of the total market capitalisation of the Australian Stock Exchange (ASX) of AU$1,347,186 at that date (ASX 2015).

[19] Figure 11 in Ainsworth et al. (2015) reveals a stark divergence in dividend pay-out ratios of Australian firms (60-75%) compared to the world equity markets (35-40%) since the introduction of dividend imputation, providing evidence that imputation has encouraged higher pay-out ratios in Australia. Pattenden and Twite (2008) find that dividend initiations, pay-outs, and reinvestment plans increased following the introduction of dividend imputation in Australia and the increases were greater for firms

perspective, we argue that because many investors are further tax-advantaged by franking credits post July 2000, demand for fully-franked dividends likely increased more. Using Australian Taxation Office (ATO) data, Handley and Maheswaran (2008) find that, on average, 67% of distributed imputation credits were used to reduce personal taxes during 1990-2000. However, this increased to 81% over 2001-2004 following the 2001 change consistent with an increase in demand from domestic investors. Jun et al.'s (2011) study of institutional tax clienteles shows that Australian institutional funds have a higher ownership of stocks which carry full franking credits compared to stocks which have partial, or zero franking credits.[20]

We contend that post-July 2000, shareholder-friendly managers of Australian firms have enhanced incentives to pay company tax (reduce tax avoidance) to generate valuable franking credits to satisfy shareholders' increased demand for fully-franked dividend income. Underlying this argument is the findings of several studies regarding pay-out responses of management. First, Desai and Jin (2011) find that managers alter pay-out policies in response to the tax preferences of their institutional investors. Second, Hanlon and Hoopes (2014) present evidence suggesting that management is conscious of, and forms pay-out policy based on, shareholder-level taxes, and that they act in a manner that maximises shareholder value. Third, Amiram et al. (2017) show that tax avoidance significantly *decreases* after an exogenous enhancement of an imputation system consistent with managers acting for the benefit shareholders, not themselves. The authors reason that tax avoidance within an imputation system merely shifts the burden of tax payments from the company to its shareholders and thus does not increase the shareholders' after-tax cash flows. They conclude that a country that eliminates its imputation system in favour of a classical system creates the incentive for managers to engage in tax avoidance to meet shareholders' compensating demand for higher after-tax cash flows.

Only Australian resident shareholders can utilise franking credits. Consequently, low marginal rate resident shareholders (e.g., superannuation funds) will prefer

with more franking credits. Recently, Balachandran et al. (2017) exploit the Australian setting and find that firms are more likely to pay dividends with higher pay-out ratios in an imputation environment compared to a traditional tax system.

[20] Bellamy (1994) finds support for the existence of dividend clienteles and increased franked dividend pay-outs relative to unfranked dividend pay-outs for the 1985-1992 period. In contrast, Grinstein and Michaely (2005) do not find tax-based preferences by institutional investors.

franked dividends whilst foreign resident shareholders will prefer capital gains or unfranked dividends. Balachandran et al. (2017) demonstrate that Australian publicly-listed firms with higher foreign institutional ownership are less likely to pay dividends and have lower pay-out ratios. Unfortunately, ownership data is not available for our sample firms during the sample period. Nevertheless, numerous foreign firms are listed on the ASX and a reasonable assumption can be made that a higher fraction of their shareholders are non-tax residents. Generally, foreign firms are excluded from samples because most of their profits will likely be subject to tax laws that diverge substantially from Australian tax laws.[21] However, given that foreign firms are likely less impacted by the enhancement to the imputation system, we employ these firms as our first control group in our difference-in-differences research design.

Considering the evidence from prior studies and based on our intuition that incentives to pay corporate tax intensified after the introduction of the rebate provision from 1 July 2000, we test the following hypothesis:

H1: Corporate tax avoidance decreased after 1 July 2000 for domestic firms relative to foreign firms.

Currently, the treated firms are a mix of non-dividend paying and dividend-paying domestic firms. The enhancement to the dividend imputation system is likely to have a greater impact on those firms that pay dividends compared to non-dividend paying firms who cannot pass on franking credits to shareholders. Therefore, we exclude non-dividend paying firms from the treatment group and test the following hypothesis:

H2: Corporate tax avoidance decreased after 1 July 2000 for dividend-paying domestic firms relative to foreign firms.

Dividend-paying domestic firms comprise three different groups depending on dividend type. First, firms without franking credits may still pay dividends provided they have sufficient accumulated profits (absence of franking credits might result from the firm incurring tax losses in prior years). In this case, the dividend will be an 'unfranked dividend'. Second, firms with some level of franking credits available

[21] Australia's territorial approach to the taxation of MNC profits means that only the Australian sourced profits of foreign firms will be taxed in Australia. Withholding tax on franked dividends paid to a non-resident shareholder of a treaty country is 0% i.e., franking (company tax paid) represents a final tax to non-resident shareholders.

from prior company tax paid, but not enough to fully-frank the dividend, may still impute these credits through a 'partly-franked dividend'. Third, firms that have paid sufficient corporate tax to generate enough franking credits to fully-frank their dividend, may distribute these credits to shareholders via a 'fully-franked dividend'. It follows that the rebate provision differentially impacts these three groups with fully-franked dividend-paying firms (unfranked dividend-paying firms) likely facing the largest increase (smallest or no increase) in incentives to increase corporate tax paid (reduce tax avoidance). We take advantage of the heterogeneity of tax avoidance incentives across these three groups to develop alternative treatment and control groups to test the following hypotheses:[22]

H3: Corporate tax avoidance decreased more after 1 July 2000 for dividend-paying domestic firms relative to non-dividend-paying domestic firms.

H4: Corporate tax avoidance decreased more after 1 July 2000 for domestic firms paying fully-franked dividends relative to dividend-paying domestic firms that do not pay fully-franked dividends.

1.3 Research design

1.3.1 Sample selection and data sources

Our sample initially consists of all companies publicly-listed on the Australian Stock Exchange (ASX) during 1997-2004. To implement our identification strategy, we restrict the sample period to this relatively narrow period (4 years either side of the legislative change) to help mitigate the influence of any confounding factors (Allen et al. 2016).[23] Several data filters and then applied. First, we exclude property partnership or trust entities due to their unique capital structures and the fact that trusts are not taxpayers.[24] Second, we exclude firms with missing data (e.g., ticker, GICS codes) and only include those firms that report in all eight financial years. We then

[22] McClure et al. (2018) use dummy variables to distinguish between two groups of dividend-paying firms; firms paying franked dividends (partly- or fully-franked) and firms paying unfranked dividends.
[23] We believe that the choice of this time window is a reasonable compromise to the trade-off between relevance and precision. The window needs to be long enough to detect meaningful changes in tax avoidance given that corporate tax strategies are usually long-term strategies that may take some time to alter. In addition, it allows us to retain a large enough sample size. However, the time window must be short enough so as not to incorporate too much noise into the analysis.
[24] Trust income is taxed in the hands of trust beneficiaries or unit holders.

retain firm-year observations for which we have data available to calculate the model variables. After imposing these requirements, our final sample is a panel of 1,901 firm-year observations for 246 firms.[25] The panel comprises the main sample of 212 domestic firms (1,655 firm-year observations) and the control sample of 34 foreign firms (246 firm-year observations). Finally, we attempt to minimise the undue influence of outliers by winsorizing all continuous variables at the 2nd and 98th percentiles of their respective distributions. Panel A of Table 1.1 summarises the sample selection procedure.

To construct the variables in our empirical models, we collect financial statement information from *Datastream*. Data relating to dividends and share prices are obtained from *SIRCA*.[26] All variables are defined in Appendix B. Panel B of Table 1.1 presents the industry distribution of the sample according to 2-digit GICS classification codes. The sample includes a greater proportion of firms in the materials (24.8%), consumer discretionary (17.5%), and industrials (17.1%) sectors, though there appears to be no significant industry bias.

1.3.2 Dependent variable

Tax avoidance activities are usually veiled in a cloak of secrecy and hence unobservable to the researcher. This makes such activities difficult to measure leading to claims that the degree of tax aggressiveness is 'in the eye of the beholder' (Hanlon and Heitzman 2010). Following prior research, (e.g., Chen et al. 2010; Rego and Wilson 2012; Lennox et al. 2013; Bird and Karolyi 2017; McClure et al. 2018), we employ the annual cash ETR (*CETR*) as the proxy for tax avoidance.[27] *CETR* is computed as income tax paid from the cash flow statement in year *t* divided by pre-tax income in the same period, and it captures a firm's ability to pay a low amount of cash taxes relative to earnings.[28] Like book ETRs, this measure only reflects non-

[25] To preserve sample size and because accounting losses due not necessarily articulate to tax losses, we retain firm-years with negative pre-tax income. In robustness checks, we exclude firm-years with negative pre-tax income following recent studies (Dyreng et al. 2017b; McClure et al. 2018). This reduces the sample to 1,411 observations.

[26] *SIRCA* is an Australian database providing financial statement, share price and corporate governance information on ASX-listed companies.

[27] The ETR is a commonly used proxy in the literature and the ATO (2006) considers a low ETR a key indicator of corporate tax avoidance.

[28] In robustness tests, we employ an alternative measure (*CETR_M*) which modifies *CETR* by replacing pre-tax net income in the denominator with cash flows from operating activities.

conforming tax avoidance, that is, tax avoidance transactions accounted for differently for book and tax purposes (Hanlon and Heitzman 2010). *CETR* reflects both temporary and permanent BTDs and a very low level of *CETR* likely captures extreme cases of tax avoidance. However, unlike book ETRs, *CETR* is unaffected by opaque income tax accruals and represents a more accurate estimate of the cash taxes paid (Dhaliwal et al. 2004).[29] Given payment of cash corporate taxes underpins the franking credit generation process, *CETR* is the most appropriate ETR measure to use in our analysis.

Consistent with prior literature (e.g., Dyreng et al. 2008; McClure et al. 2018) we constrain *CETR* to fall within the [0, 1] interval to ensure a valid interpretation of tax avoidance. Finally, firms generally have stronger incentives for tax avoidance when the statutory corporate tax rate is higher, so tax avoidance likely varies with statutory tax rate changes. During our sample period, the statutory corporate tax rate changed several times. For fiscal years ending 30 June 1997 through 30 June 2000 it was 36% and then decreased to 34% for the 2001 financial year. It then decreased again to 30% for the 2002 and subsequent financial years. We follow Ikin and Tran (2013) and take these changes into account by dividing *CETR* by the statutory corporate tax rate prevailing at the time. Tax avoidance activities are minimal when the ratios are close to unity and the smaller the ratios, the more aggressive is the tax strategy.

1.3.3 Regression model

We employ a difference-in-differences specification to analyse the effect of the change in the dividend imputation system on tax avoidance (Dyreng et al. 2016). We construct several treatment and control groups to test the four hypotheses. This research design allows us to control for time invariant differences between treatment and control groups in addition to general economic trends common to both groups. We estimate different variations of the following baseline specification:

[29] A firm's book ETR is total income tax expense divided by pre-tax accounting income and measures the taxes on the current period's pre-tax income reported in the financial statements. However, the concern with this proxy is that both the numerator and denominator are recorded on an accruals basis, thus differences between the timing of income and expenses for financial reporting and tax reporting are reflected in the measure. It reflects aggressive tax planning through permanent book-tax differences (BTDs), that is, a tax strategy that defers tax (e.g., accelerated depreciation for tax purposes) will not alter the book ETR. In contrast, cash ETRs are computed using cash taxes paid in the numerator so that tax avoidance activities that decrease a firm's cash tax burden will directly impact the firm's cash ETR.

$$CETR_{i,t} = \alpha_0 + \alpha_1 TREATED_{i,t} + \alpha_2 TREATED*POST_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 INTANG_{i,t} + \alpha_7 CAPINT_{i,t} + \alpha_8 MKTBK_{i,t} + \alpha_9 RND_{i,t} + \varepsilon_{i,t} \quad (1)$$

TREATED is a dummy variable equal to 1 for each of the treatment groups used in the analysis, and 0 otherwise. Treatment groups include domestic firms, domestic dividend-paying firms, domestic firms where all dividends paid are fully-franked, and domestic firms where at least one dividend paid is fully-franked. The legislative change became effective 1 July 2000, so we include an indicator variable denoted *POST* which takes the value of 1 for financial years ending 30 June 2001 onward and 0 otherwise. α_1 reflects the average difference in *CETR* between treatment and control firms in the pre-1 July 2000 period. Our variable of interest is the interaction between *TREATED* and *POST*. To test all hypotheses, we examine α_2, the coefficient on *TREATED*POST* which is the difference-in-differences estimate of the effect of the change in the dividend imputation system on tax avoidance in the post-period. A positive (negative) coefficient on this interaction variable indicates an increase (decrease) in *CETR* corresponding to a decrease (increase) in tax avoidance of treatment firms relative to control firms. In all four hypotheses, we predict a positive coefficient for α_2.

We include an array of controls identified in prior research as influencing tax avoidance to help alleviate concerns that correlated omitted variables are confounding inferences. We control for general tax planning determinants with firm size (*SIZE*) because larger firms may have higher political costs (Zimmerman 1983), or greater tax planning opportunities via economies of scale and greater sophistication (Mills et al. 1998; Rego 2003). We control for firm performance because some studies document a negative association between firm profitability (*ROA*) and tax avoidance (Gupta and Newberry 1997; Plesko 2003), while others find a positive association (Rego 2003; Armstrong et al. 2012). We also control for leverage (*LEV*) because firms may reduce tax liabilities through the tax-deductibility of interest expenses (Plesko 2003; Markle and Shackleford 2012b).[30,31]

[30] Interest expenses are fully tax-deductible in Australia (subject to thin-capitalisation rules).

[31] Some studies find a negative association between leverage and tax avoidance (Chen et al. 2010) possibly due to the debt substitution effect (Graham and Tucker 2006). Interest payments reduce taxable profits and pre-tax earnings, thus attenuating the effect of leverage on ETRs.

Firms may use intangible assets (e.g., patents, trademarks) to shift income to low-tax jurisdictions thereby lowering tax liabilities. So, we use *INTANG*, measured as intangible assets scaled by total assets, to control for intangible assets (Chen et al. 2010). Higher levels of property, plant and equipment usually result in higher tax-deductible depreciation expenses leading to a positive association between capital intensity (*CAPINT*) and tax avoidance (Gupta and Newberry 1997). Firms with more growth or investment opportunities likely face different tax planning incentives than mature firms, so we use the market-to-book ratio (*MKTBK*) to proxy for growth opportunities (Chen et al. 2010). Lastly, we control for research and development (R&D) intensity (*RND*) because Australian firms receive generous R&D incentives which may lower taxable income (McClure et al. 2018).[32]

Finally, we present the results for two versions of the specification. The first version includes industry and year fixed effects to control for industry characteristics and to capture general changes in tax planning over time.[33] The second version replaces the industry fixed effects with firm fixed effects to capture unobservable time-invariant firm characteristics. Note, that these latter models preclude the inclusion of *TREATED*, a time-invariant firm variable.

1.4 Empirical results

1.4.1 Descriptive statistics

We begin by scrutinising the time trend of *CETR* for each of the treatment and control group pairings used in the empirical analysis. Figure 1.1 illustrates that in each pairing, the trend in *CETR* before the change in the dividend imputation system is similar. For example, in Panels A and B, the pre-change trend in *CETR* for domestic and foreign firms is similar. Although, this trend appears to continue after the introduction of the rebate provision in 2000. In Panels C and D, despite level differences, the pre-change trend in *CETR* between both pairings is similar but noticeable increases for both treatment groups after the year 2000. Overall, the similar pre-change trends in *CETR* in each panel provides comfort that the treatment and

[32] Following prior literature (e.g., Dyreng et al. 2016), we replace missing values of *RND* with zero. This is reasonable in our sample as most of the missing values are for financial and insurance firms.
[33] The inclusion of year fixed effects precludes the use of *POST* as a stand-alone variable in the model.

control group combinations selected for analysis satisfy the parallel trends assumption underlying the difference-in-differences methodology (Roberts and Whited 2013).

Table 1.2 presents descriptive statistics for the variables used in the empirical analysis. Panel A (Panel B) presents statistics for the full sample (reduced sample where the treatment firms are domestic dividend-paying firms).[34] In both panels, the results for *CETR* and the modified *CETR* used in robustness tests (*CETR_M*) are shown along with their values prior to dividing by the statutory corporate tax rate (denoted with _A). In Panel A, the mean (median) of *CETR_A* is 0.194 (0.135). Foreign firms have significantly higher ETRs than domestic firms (mean *CETR_A* of 0.226 compared to 0.189). Using mean pre-tax income of A$267.51m for these firms over the sample period, this difference represents approximately A$9.90m more in cash taxes paid by the average foreign firm compared to the average domestic firm.[35] However, in Panel B, the mean (median) of *CETR_A* is 0.254 (0.241) and foreign firms have significantly lower values of *CETR* relative to domestic dividend-paying firms. This difference represents about A$9.36m more in cash taxes paid by the average domestic dividend-paying firm compared to the average foreign firm.[36] In both panels, cash ETRs are substantially lower than the statutory corporate tax rate for all groups similar to findings in prior studies (e.g., Dyreng et al. 2008). Over the sample period, the statutory company tax rate in Australia varied between 0.30 and 0.36 with a mean (median) of 0.335 (0.340).

Table 1.3 reports the means and difference in means of cash ETRs across sample groups. In Panel A, we find that domestic dividend-paying firms have a significantly higher *CETR* (0.782) and *CETR_A* (0.261) than domestic non-dividend-paying firms (0.130 and 0.043 respectively). Likewise, in Panel B, domestic firms who fully-frank all dividends have a significantly higher *CETR* (0.908) and *CETR_A* (0.302) than domestic dividend-paying firms who do not fully-frank all their dividends (0.483 and 0.163 respectively). Similarly, the results in Panel C show that domestic firms who pay at least one fully-franked dividend have significantly higher cash ETRs than domestic dividend-paying firms who do not pay any fully-franked dividends. The

[34] We present descriptive statistics for both group pairings because the majority of domestic non-dividend-paying firms excluded in Panel B are loss firms which impacts the values of the ETRs.
[35] $267.51m x (0.226 - 0.189)
[36] Mean pre-tax income for this group of firms over the sample period is A$373.67m, giving $373.67m x (0.261 – 0.226).

difference in cash taxes paid ranges from about A$35.70m to A$40.97m.[37] Overall, these results are in line with our expectations that tax avoidance incentives differ across these groups depending upon firm pay-out policy. Domestic firms paying fully-franked dividends have the highest cash ETRs, while domestic non-dividend-paying firms have the lowest cash ETRs. These results suggest that dividend-paying firms, especially fully-franked dividend-paying firms, engage in less tax avoidance.

1.4.2 Correlation results

The Pearson (below the diagonal) and Spearman (above the diagonal) correlations are presented in Table 1.4. In both panels, we find that the two *CETR* proxies are positively correlated with one another, suggesting both capture the same underlying construct. In 3 out of 4 cases, we find a positive and significant correlation between *CETR* and *POST*. While only suggestive of the underlying relation between these variables, these correlations provide preliminary support for the assertion that tax avoidance decreases after the change in the imputation system. Correlations among the control variables appear reasonable. The highest correlation coefficient, 0.489, is observed between *SIZE* and *LEV*, suggesting that multicollinearity is not a concern.

1.4.3 Univariate tests of changes in tax avoidance

Table 1.5 reports the means and the difference in means for *CETR* before and after 1 July 2000 for all sample groups. The mean of *CETR* in the post-period is significantly *higher* than the pre-period in all cases except for foreign firms (c) and domestic non-dividend paying firms (e). As expected, the largest increase is found in (d), (f) and (g) for domestic dividend-paying firms. For example, the difference in the mean *CETR* for domestic dividend paying firms is 0.147 (0.855 – 0.708) significant at the 1% level (*t*-stat = 3.65). Using mean pre-tax income of A$254.45m for these firms over the sample period, this difference represents about A$12.53m more in cash taxes paid in the post-period relative to the pre-period.[38] Although *CETR* for foreign firms increased by 0.087 from 0.635 in the pre-period to 0.722 in the post-period, the

[37] Mean pre-tax income for the domestic firms is A$171.83m, giving a difference of A$37.46m ($171.83m x (0.261 – 0.043)). Mean pre-tax income for the domestic dividend-paying firms is A$254.45m, giving a difference of A$35.70m ($254.45m x (0.302 – 0.163)) for firms in Panel B and A$40.97m ($254.45m x (0.299 – 0.138)) for firms in Panel C.

[38] The mean statutory corporate tax rate over the sample period is 0.335. Therefore, the difference is (($254.45m x (0.855 – 0.708)) x 0.335).

increase is not significant (*t*-stat = 0.94). This preliminary evidence is consistent with our argument that the enhancement to the dividend imputation system *increased* the incentives for certain firms to take a less aggressive approach to tax avoidance.

1.4.4 Multivariate tests of changes in tax avoidance

Table 1.6 presents the results from estimating Equation (1) for the full sample. The *p*-values are provided in parentheses and are based on heteroscedasticity-robust standard errors (White 1980) and the standard errors are clustered at the firm level (Petersen 2009). Model (1) presents the results when industry and time fixed effects are included while Model (2) shows the results inclusive of firm and time fixed effects. In both models, we find that the coefficient on *TREATED*POST* (0.034 and 0.042 respectively) is not statistically significant. Therefore, we cannot reject the null hypothesis and find no support for H1.

Next, following the logic outlined in Section 1.2, we modify the treatment and control groups. First, we only include domestic dividend-paying firms in the treatment group as these firms are more likely impacted by the change to the dividend imputation system than domestic non-dividend paying firms. This procedure decreases the sample size from 1,901 observations to 1,355 observations. We re-estimate Equation (1) for this sample and Table 1.7 presents the results. Similar to the results in Table 1.6, the coefficient on our variable of interest (*TREATED*POST*), 0.067 and 0.074 in Models (1) and (2) respectively, is statistically insignificant. Again, we are unable to reject the null hypothesis and find no support for H2. The inability to reject the null hypothesis in Tables 1.6 and 1.7 could be due to the relatively small number of foreign firms (246 observations) thus we may lack statistical power to detect some effects.

We then replace foreign firms in the control sample with domestic non-dividend-paying firms. We expect the treatment group comprising domestic dividend-paying firms will decrease tax avoidance (increase *CETR*) more in response to the enhanced imputation system relative to domestic non-dividend-paying firms. Table 1.8 presents the results from re-estimating Equation (1). The coefficient on *TREATED*POST* in Model (1) is 0.101 (*p*-value = 0.146) and in Model (2) is 0.137 (*p*-value = 0.040). The direction of these coefficients is in line with our prediction and the coefficients are significant at the 10% and 5% levels respectively, using one-tailed tests of statistical

significance. Therefore, the results support H3. The coefficient estimate in Model (2) suggests that the change to the dividend imputation system is associated with an increase in *CETR* of 13.7% ($7.89m in cash taxes paid) for domestic dividend-paying firms relative to domestic non-dividend-paying firms.[39]

Finally, we test H4 by adjusting the treatment and control groups again. We expect that corporate tax avoidance decreased more after 1 July 2000 for domestic firms paying fully-franked dividends relative to dividend-paying domestic firms that do not pay fully-franked dividends. However, many domestic dividend-paying firms pay multiple dividends during the year and depending upon their franking credit account balance, may pay a mix of fully-franked, partially-franked and unfranked dividends. Therefore, we re-estimate Equation (1) using two different sub-groups and present the results in Table 1.9. In Model (1), the treatment group comprises domestic firms that pay at least one fully-franked dividend while the control group comprises domestic dividend-paying firms that do not pay at least one fully-franked dividend. That is, the control group comprises domestic firms that pay either unfranked dividends, partially-franked dividends, or a combination of the two. In Model (2), the treatment group (control group) comprises domestic dividend-paying firms that fully-frank all dividends (do not fully-frank all dividends).

The results in Table 1.9 support H4. The coefficient on *TREATED*POST* is 0.118 (*p*-value = 0.20) in Model (1) and 0.261 (*p*-value = 0.035) in Model (2). These coefficients are significant at the 10% and 5% level respectively using one-tailed tests of statistical significance. In Models (3) and (4), the coefficient on *TREATED*POST* increases in magnitude and significance consistent with expectations. Specifically, in Model (3) the coefficient is 0.176 (*p*-value = 0.058) and in Model (4) is 0.273 (*p*-value = 0.011). This suggests that the introduction of the rebate provision is associated with an increase in *CETR* of between 17.6% ($15.00m in cash taxes paid) and 27.3% ($23.27m in cash taxes paid) for domestic dividend-paying firms that fully-frank all dividends compared to those that do not fully-frank all dividends).[40]

[39] Mean pre-tax income for the domestic firms over the sample period is $171.83m and the mean statutory corporate tax rate over the sample period is 0.335. Therefore, additional cash taxes paid = ($171.83m x 0.137) x 0.335 = $7.89m.

[40] Mean pre-tax income for the domestic dividend-paying firms over the sample period is $254.45m and the mean corporate tax rate over the sample period is 0.335. Therefore, additional cash taxes paid ranges from $15.00m (($254.45m x 0.176) x 0.335) and $23.27m (($254.45m x 0.273) x 0.335).

Overall, the results are consistent with our intuition that the change to the dividend imputation system effective 1 July 2000 provided *stronger* incentives for firms paying franked-dividends to minimise tax avoidance to generate further imputation credits demanded by tax-advantaged shareholders. In particular, the incentives appear to have increased more for those firms paying fully-franked dividends. This finding suggests that managers of domestic dividend-paying firms are acting in the best interests of their resident shareholders who can utilise these tax credits to reduce their own tax liabilities. Notably, our findings are consistent with those of McClure et al. (2018) who find that domestic firms paying dividends with franking credits undertake less tax avoidance than those firms who pay unfranked dividends.

1.5 Robustness tests

1.5.1 Alternative proxy for tax avoidance

Given the challenge in measuring tax avoidance precisely and because each measure has its own limitations (Blouin 2014), we employ an additional proxy. Since the denominator in *CETR* is pre-tax net income, low *CETR*s may be driven by upwards earnings management. Moreover, if tax-avoiding firms simultaneously report lower accounting earnings and lower taxable income (i.e., conforming tax avoidance), then any change in *CETR* may be mechanical and we might be inadvertently capturing a denominator effect only (Hanlon and Heitzman 2010). Consequently, the second measure (*CETR_M*) modifies *CETR* by substituting net cash flows from operating activities for pre-tax net income in the denominator (Dyreng et al. 2008). Equation (1) is then re-estimated for all treatment and control group combinations. Overall, the results using *CETR_M* (untabulated) are qualitatively similar to those in the main findings. For example, the coefficient on *TREATED*POST* corresponding to Model (2) in Table 1.8 is 0.104 (*p*-value = 0.054) and corresponding to Models (2) and (4) in Table 1.9 is 0.144 (*p*-value = 0.025) and 0.101 (*p*-value = 0.081), respectively. Thus, our inferences remain unchanged.

1.5.2 Exclusion of financial and insurance firms

Some studies of tax avoidance exclude financial and insurance firms from their samples (e.g., Beuselinck et al. 2015; Richardson and Taylor 2015; McClure et al.

2018).[41] These firms are excluded because of special regulatory constraints imposed on them that potentially affect their tax avoidance activities coupled with differences in their application of accounting policies and derivation of accounting estimates compared to firms in other industries (Rego 2003). In our setting, we are concerned that these firms may unduly influence the results when *CETR_M* is the dependent variable because of the types of cash flows they include within net cash flow from operating activities. Therefore, we drop firms with GICS sector code 40 (184 firm-year observations) and re-run all analyses. The results (untabulated) mirror those in the primary analysis although some coefficients on the variable of interest increase in magnitude and significance. For example, the coefficient on *TREATED*POST* pertaining to Model (3) in Table 1.9 is 0.204 (*p*-value = 0.041) and for Model (4) is 0.280 (*p*-value = 0.005). When *CETR_M* is the dependent variable, the results are similar to those found in Section 1.5.1 above alleviating any concerns.

1.5.3 Exclusion of firm-years with negative pre-tax income

Recent studies of tax avoidance (e.g., Ikin and Tran 2013; Dyreng et al. 2016; McClure et al. 2018) exclude firm-year observations with negative pre-tax income on the basis that ETRs are difficult to interpret when the denominator is negative, and these firms may be in a different tax planning position relative to profitable firms.[42] In our main analysis, we retain firm-year observations with negative pre-tax income (490 firm-year observations) to preserve sample size and because accounting losses do not necessarily translate to tax losses. Numerous adjustments for permanent and temporary differences are made to accounting net income to arrive at taxable income. Nevertheless, we follow prior literature and exclude these firm-year observations and re-estimate all models. The results (untabulated) are qualitatively similar to those in the main findings but the magnitude and statistical significance decreases for some of the coefficients on our variable of interest. For example, the coefficients on *TREATED*POST* relating to Table 1.8 roughly half in magnitude and lose statistical significance. Furthermore, the coefficient on *TREATED*POST* corresponding to Models (2) and (4) in Table 1.9 is 0.241 (*p*-value = 0.024) and 0.226 (*p*-value = 0.012),

[41] We note that other papers retain financial and insurance firms in their samples (e.g., Ikin and Tran 2013; Dyreng et al. 2016).
[42] *CETR* is constrained to the [0,1] interval so any negative values of cash taxes paid or pre-tax income result in the value of *CETR* being 0.

respectively. Overall, the results of this robustness test do not alter the inferences we draw from our main findings.

1.5.4 Alternative proxy for *POST*

While the majority of our sample (163 firms or 66%) have a 30 June fiscal year-end, some do not, meaning their 2000 financial year will include a mix of pre-1 July 2000 and post-1 July 2 000 data.[43] To account for this timing issue and the possibility that some firms alter tax avoidance behaviour in anticipation of the impending change in legislation, we modify the *POST* variable to take the value of 1 for financial years ending after the 1999 financial year, and 0 otherwise (denoted *POST_1999*).[44] In untabulated results, we find evidence of changes in behaviour prior to 1 July 2000 or that some firms with a non-30 June year end are influencing the results. For example, the coefficient on *TREATED*POST* relating to Model (2) in Table 1.8 is 0.129 (*p*-value = 0.033) and the coefficient on *TREATED*POST* relating to Models (2) and (4) in Table 1.9 is 0.225 (*p*-value = 0.052) and 0.200 (*p*-value = 0.051), respectively. Notably, the magnitude of these coefficients is smaller than those in the main analysis suggesting that the significant change in tax avoidance occurred after 1 July 2000.

1.6 Conclusion

Corporate tax avoidance is a major concern for governments, exacerbated in recent years by the global financial crisis and its aftermath. We exploit an exogenous shock to Australia's full dividend imputation system which enhanced the value of franking credits for tax-advantaged resident shareholders. This identification strategy arguably allows for cleaner identification of the relation between dividend imputation and tax avoidance. Overall, we find evidence to suggest that the rule change altered the incentives of management to engage in tax avoidance. Specifically, we initially find that cash ETRs of domestic firms increased significantly after 1 July 2000, especially for franked-dividend paying firms. Then, implementing a differences-in-differences design, we find an increase in cash ETRs for domestic dividend-paying

[43] The year to which *Datastream* assigns financial data is the year in which the company's fiscal year ended, so fiscal years ending 28 February 2000 (1 firm), 31 March 2000 (7 firms), 30 April 2000 (1 firm), 31 May 2000 (1 firm), 31 July 2000 (10 firms), 31 August 2000 (1 firm) 30 September 2000 (12 firms), and 31 December 2000 (50 firms), are all treated as 2000 in *Datastream* (Thomson 2007).
[44] The *possibility* of tax reform was announced by the Commonwealth Treasurer in August 1998.

firms relative to non-dividend-paying domestic firms. In line with our expectations, this finding is even more pronounced for firms paying fully-franked dividends and the decreases in tax avoidance are economically significant. The findings are consistent with the notion that tax avoidance decreased for domestic firms who can take advantage of the rule change for the benefits of shareholders.

This study has several limitations. First, tax return data is private and hence our tax avoidance proxies are constructed based on publicly available financial statement data. The efficacy of such measures has been questioned (Hanlon and Heitzman 2010; Blouin 2014), so our results should be interpreted with caution. Second, the empirical specifications are potentially complicated by reverse causality and omitted correlated variables. We have attempted to address potential endogeneity by exploiting an exogenous shock and by employing a differences-in-differences research design, and we have included an array of control variables in the empirical models that have been shown in prior literature to be associated with tax avoidance. However, although we include time fixed effects in our models, we acknowledge the possibility that our results may be driven by increases in tax authority enforcement over the sample period. However, this would likely affect all firms equally so would not fully explain the results found. Another caveat relates to the results utilising foreign firms as the control group. We have a relatively small sample of foreign firms, so our null result could be due to lack of statistical power. Finally, we note one-tailed tests of statistical significance in some models where we have signed predications and the coefficient is consistent with the prediction. However, we note that two-tailed tests are sometimes not significant at conventional levels.

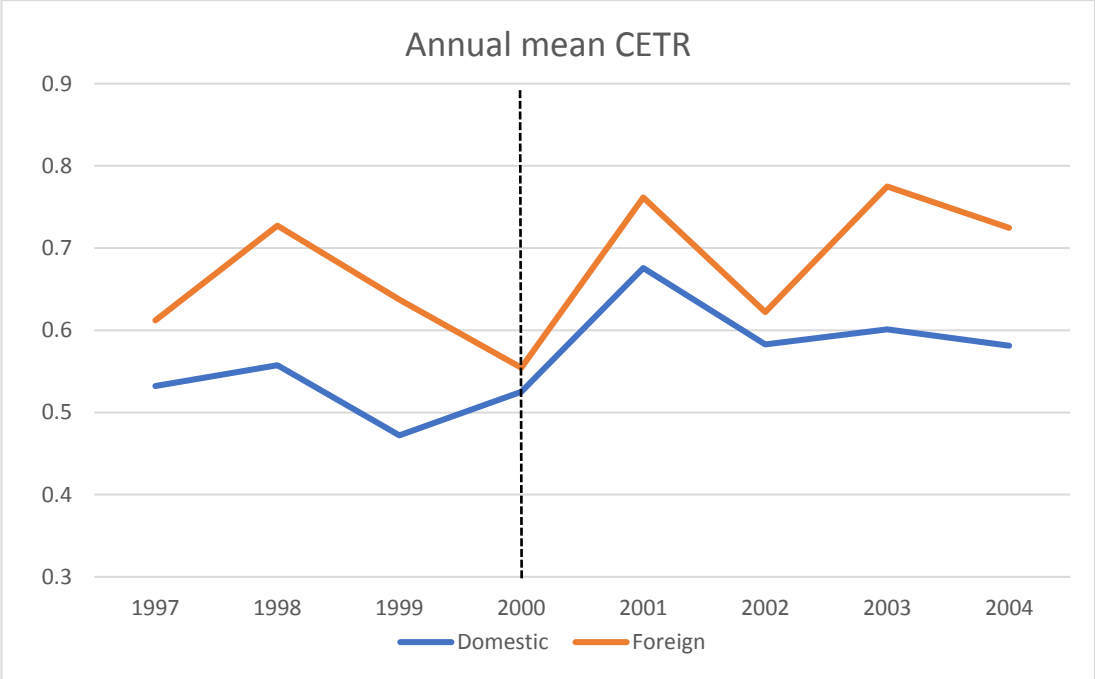
Nonetheless, this study can inform ongoing policy debates in Australia. Recent tax reform reports have recommended the abolition of dividend imputation and the introduction of an Allowance for Corporate Equity and/or cash flow tax. However, the evidence provided in this study highlights the benefits of maintaining a full divided imputation system due to the incentives it provides to Australian dividend-paying firms to minimise tax avoidance activity. Hence, our results speak to the potential of full dividend imputation to help protect corporate tax system integrity.

1.7 Tables and figures

Figure 1.1: Mean annual CETR over the sample period

Panels A–D plot the annual mean CETR over 1997-2004 for different treatment and control groups.

Panel A: Domestic firms and foreign firms



Panel B: Domestic dividend-paying firms and foreign firms

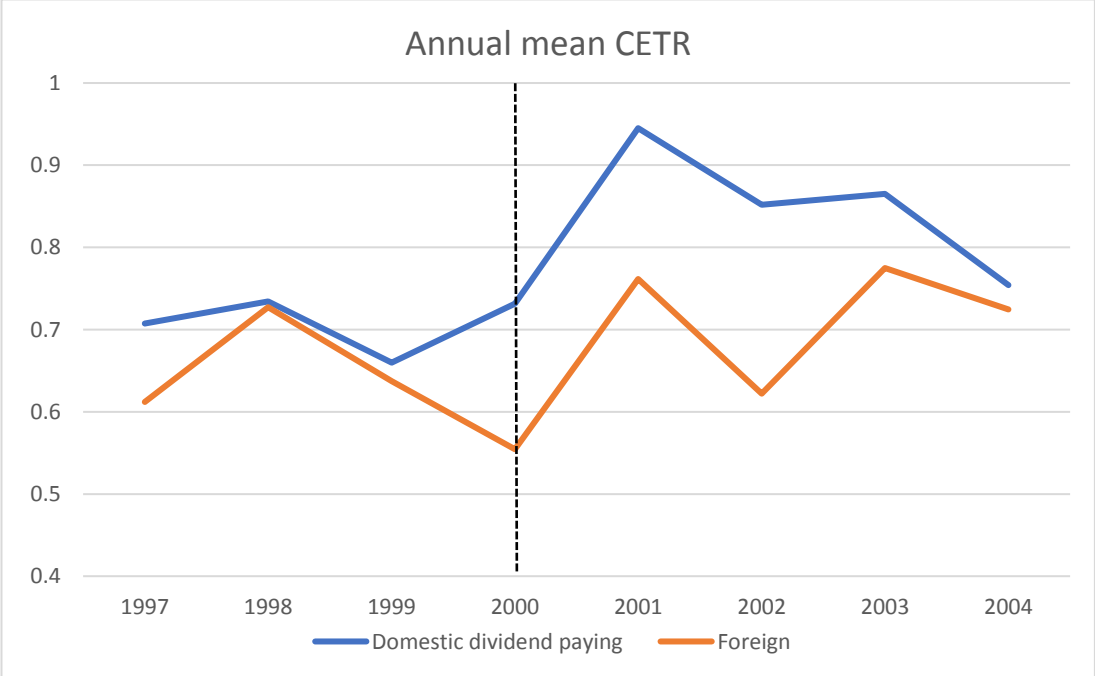
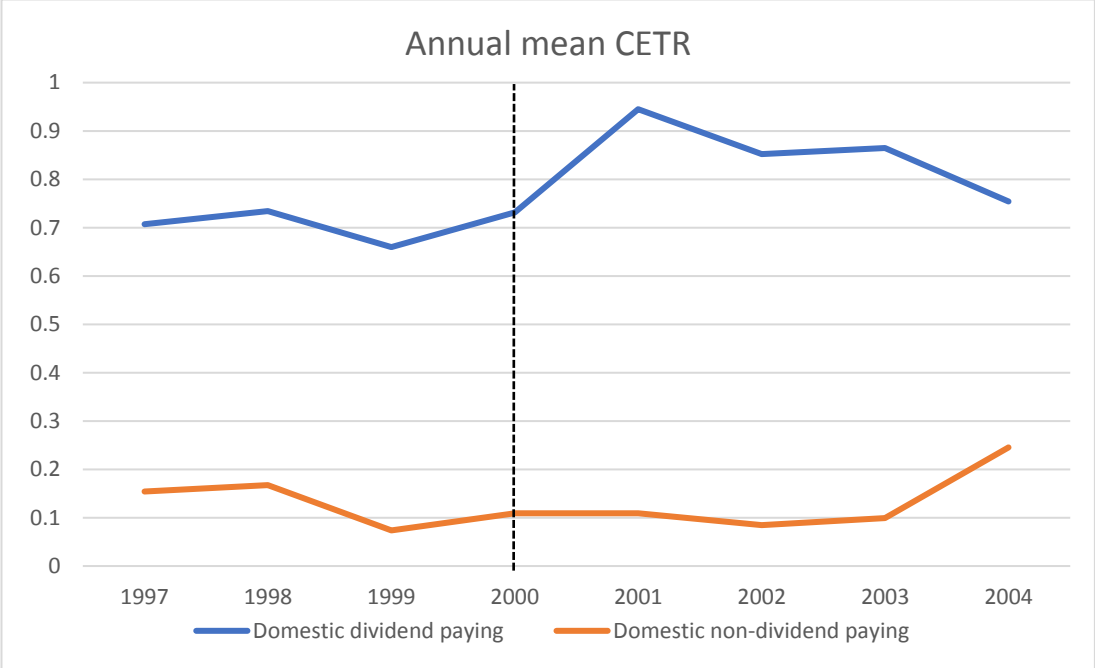


Figure 1.1: Mean annual CETR over the sample period (continued)

Panels A–D plot the annual mean CETR over 1997-2004 for different treatment and control groups.

Panel C: Domestic dividend-paying firms and domestic non-dividend-paying firms



Panel D: Domestic firms where all dividends paid are fully-franked and domestic firms where all dividends are not fully-franked

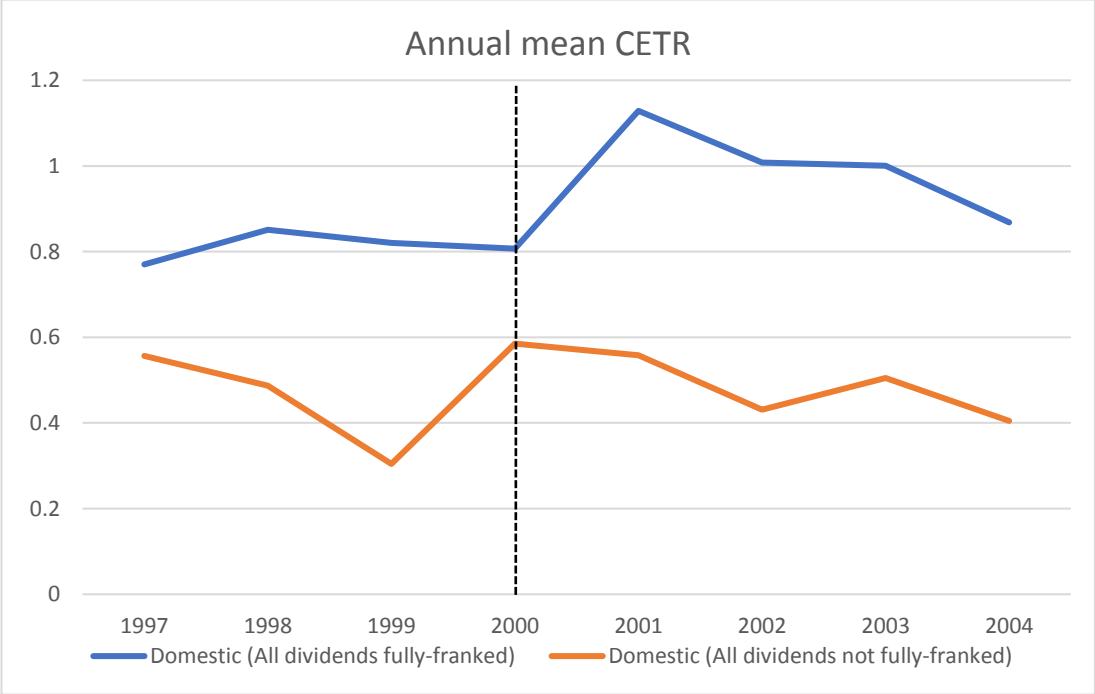


Table 1.1: Sample details

This table reports an overview of the sample. Panel A outlines the sample selection procedure. Panel B presents the industry distribution of the sample according to 2-digit GICS classification codes.

Panel A: Sample selection procedure

Criteria	Firms	Firm-years
All firms on the ASX from 1997-2004	1,839	8,359
Less: real estate investment trusts and property firms	(116)	(528)
Less: firms with missing identifiers (e.g., ticker, GICS code)	(76)	(269)
Less: firms that do not report across all years 1997-2004	(1,400)	(5,587)
Less: firm-years with missing data to calculate variables	(1)	(74)
	246	1,901
1997-2000	246	938
2001-2004	246	963
	246	1,901
Main sample (domestic firms)	212	1,655
Control sample (foreign firms)	34	246
	246	1,901

Panel B: Industry distribution

GICS	Industry description	Firms	Firm-years	Frequency (% of total)
10	Energy	18	141	7.4%
15	Materials	64	471	24.8%
20	Industrials	41	325	17.1%
25	Consumer discretionary	42	333	17.5%
30	Consumer staples	24	190	10.0%
35	Health care	14	111	5.8%
40	Financials	24	184	9.7%
45	Information technology	10	77	4.0%
50	Telecommunications services	3	24	1.3%
55	Utilities	6	45	2.4%
	Total	246	1,901	100.0%

Table 1.2: Descriptive statistics

This table presents summary statistics for the variables used in the empirical analysis. Panel A (Panel B) presents summary statistics for the full sample (reduced sample). The sample period is 1997-2004. Effective tax rates are constrained to lie on the [0,1] interval and are presented prior to (CETR_A and CETR_M_A) and after (CETR and CETR_M) dividing by the statutory corporate tax rate. All continuous variables are winsorized at the 2% and 98% level. All variables are defined in Appendix B. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: Summary statistics (Full sample: treatment group = domestic firms; control group = foreign firms)

	Full sample						Treatment group (*n*=1,655)		Control group (*n*=246)	
Variable	*n*	Mean	SD	P25	P50	P75	Mean	Median	Mean	Median
CETR_A	1,901	0.194	0.230	0.000	0.135	0.318	0.189	0.121	0.226**	0.174***
CETR_M_A	1,901	0.149	0.187	0.000	0.099	0.232	0.144	0.093	0.184***	0.134***
CETR	1,901	0.581	0.691	0.000	0.406	0.952	0.567	0.371	0.678**	0.506***
CETR_M	1,901	0.445	0.552	0.000	0.299	0.686	0.430	0.278	0.549***	0.411***
SIZE	1,901	12.832	2.423	11.227	12.824	14.451	12.637	12.633	14.146***	14.015***
ROA	1,901	-0.012	0.265	-0.002	0.048	0.097	-1.016	0.048	0.016*	0.044
LEV	1,901	0.477	0.243	0.324	0.482	0.615	0.476	0.482	0.483	0.490
INTANG	1,901	0.106	0.176	0.000	0.018	0.131	0.107	0.017	0.098	0.019
CAPINT	1,901	0.352	0.268	0.114	0.322	0.556	0.340	0.308	0.430***	0.423***
MKTBK	1,901	2.856	4.147	0.709	1.582	2.920	2.747	1.611	3.587***	1.156**
RND	1,901	0.017	0.079	0.000	0.000	0.000	0.018	0.000	0.012	0.000

Table 1.2: Descriptive statistics (continued)

This table presents summary statistics for the variables used in the empirical analysis. Panel A (Panel B) presents summary statistics for the full sample (reduced sample). The sample period is 1997-2004. Effective tax rates are constrained to lie on the [0,1] interval and are presented prior to (CETR_A and CETR_M_A) and after (CETR and CETR_M) dividing by the statutory corporate tax rate. All continuous variables are winsorized at the 2% and 98% level. All variables are defined in Appendix B. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel B: Summary statistics (Reduced sample: treatment group = domestic dividend-paying firms; control group = foreign firms)

	Reduced sample						Treatment group (*n*=1,109)		Control group (*n*=246)	
Variable	*n*	Mean	SD	P25	P50	P75	Mean	Median	Mean	Median
CETR_A	1,355	0.254	0.228	0.055	0.241	0.362	0.261	0.250	0.226**	0.174***
CETR_M_A	1,355	0.194	0.188	0.061	0.172	0.261	0.197	0.178	0.184	0.134***
CETR	1,355	0.763	0.684	0.161	0.719	1.080	0.782	0.750	0.678**	0.506***
CETR_M	1,355	0.581	0.555	0.183	0.516	0.787	0.588	0.537	0.549	0.411***
SIZE	1,355	13.661	2.070	12.254	13.466	15.058	13.552	13.414	14.146***	14.015***
ROA	1,355	0.063	0.127	0.025	0.064	0.109	0.074	0.068	0.016***	0.044***
LEV	1,355	0.510	0.202	0.399	0.505	0.619	0.517	0.508	0.483**	0.490*
INTANG	1,355	0.115	0.175	0.001	0.028	0.158	0.119	0.031	0.098	0.019***
CAPINT	1,355	0.354	0.249	0.142	0.329	0.539	0.337	0.314	0.430***	0.423***
MKTBK	1,355	3.207	4.363	0.978	1.776	3.265	3.123	1.845	3.587	1.156***
RND	1,355	0.006	0.034	0.000	0.000	0.000	0.004	0.000	0.012***	0.000

Table 1.3: Effective tax rates across sample groups

This table reports the means and the difference in means for CETR. The sample period is 1997-2004. Effective tax rates are constrained to lie on the [0,1] interval and are presented prior to (CETR_A) and after (CETR) dividing by the statutory corporate tax rate. All variables are defined in Appendix B. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: Domestic dividend-paying firms (DIV) vs. domestic non-dividend-paying firms (NODIV)

Variable	Mean	Mean	Difference	*t*-stat	*p*-value
n=1,655	(DIV) *n*=1,109	(NODIV) *n*=546			
CETR_A	0.261	0.043	0.218***	20.50	0.000
CETR	0.782	0.130	0.652***	20.38	0.000

Panel B: Domestic firms where all dividends paid are fully-franked (FF) vs. domestic firms where all dividends paid are not fully-franked (NO_FF)

Variable	Mean	Mean	Difference	*t*-stat	*p*-value
n=1,109	(FF) *n*=779	(NO_FF) *n*=330			
CETR_A	0.302	0.163	0.139***	9.82	0.000
CETR	0.908	0.483	0.425***	10.04	0.000

Panel C: Domestic firms where at least one dividend paid is fully-franked (FF_1) vs. domestic firms where no dividends paid are fully-franked (NO_FF_1)

Variable	Mean	Mean	Difference	*t*-stat	*p*-value
n=1,109	(FF_1) *n*=846	(NO_FF_1) *n*=263			
CETR_A	0.299	0.138	0.161***	10.75	0.000
CETR	0.898	0.407	0.491***	10.86	0.000

Table 1.4: Correlations matrix

This table presents the correlations between the variables. Panel A (Panel B) presents summary statistics for the full sample (reduced sample). Pearson correlation coefficients are shown below the diagonal while Spearman correlation coefficients are shown above the diagonal. Significant (*p*-value < 0.05) coefficients are reported in bold. All variables are defined in Appendix B.

Panel A: Full sample: treatment group = domestic firms; control group = foreign firms (*n*=1,901)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	CETR		**0.786**	**-0.066**	0.033	**0.440**	**0.486**	**0.264**	**0.274**	0.040	**0.267**	**0.051**
(2)	CETR_M	**0.544**		**-0.076**	0.034	**0.405**	**0.493**	**0.229**	**0.284**	-0.017	**0.310**	0.043
(3)	TREATED	**-0.054**	**-0.072**		0.015	**-0.211**	-0.023	-0.017	0.010	**-0.106**	**0.054**	-0.015
(4)	POST	**0.063**	0.028	0.015		**0.055**	**-0.047**	-0.018	**0.066**	-0.018	0.008	-0.031
(5)	SIZE	**0.325**	**0.231**	**-0.209**	**0.048**		**0.222**	**0.440**	**0.271**	**0.068**	**0.185**	**0.078**
(6)	ROA	**0.288**	**0.259**	-0.041	**-0.069**	**0.379**		0.008	**0.169**	**0.093**	**0.376**	0.040
(7)	LEV	**0.200**	**0.148**	-0.009	-0.004	**0.466**	-0.000		**0.141**	-0.027	**0.130**	-0.019
(8)	INTANG	**0.124**	**0.117**	0.017	**0.076**	**0.102**	0.009	-0.016		**-0.174**	**0.126**	**0.101**
(9)	CAPINT	0.005	**-0.088**	**-0.113**	-0.016	0.025	**0.048**	**-0.058**	**-0.281**		-0.042	0.031
(10)	MKTBK	**0.067**	**0.156**	**-0.068**	**-0.061**	0.039	**0.138**	0.045	0.036	**-0.060**		**0.117**
(11)	RND	**-0.139**	**-0.121**	0.024	0.024	**-0.205**	**-0.267**	**-0.151**	0.021	**-0.155**	**0.103**	

Table 1.4: Correlations matrix (continued)

This table presents the correlations between the variables. Panel A (Panel B) presents summary statistics for the full sample (reduced sample). Pearson correlation coefficients are shown below the diagonal while Spearman correlation coefficients are shown above the diagonal. Significant (*p*-value < 0.05) coefficients are reported in bold. All variables are defined in Appendix B.

Panel B: Reduced sample: treatment group = domestic dividend-paying firms; control group = foreign firms (*n*=1,355)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	CETR		**0.674**	**0.090**	**0.089**	**0.102**	**0.214**	**0.174**	**0.138**	0.021	**0.157**	0.044
(2)	CETR_M	**0.457**		**0.084**	**0.074**	0.009	**0.314**	**0.079**	**0.147**	**-0.090**	**0.267**	0.019
(3)	TREATED	**0.059**	0.027		0.011	**-0.120**	**0.122**	0.049	**0.089**	**-0.122**	**0.128**	-0.019
(4)	POST	**0.100**	0.051	0.011		**0.111**	-0.024	-0.042	**0.108**	-0.042	0.046	-0.021
(5)	SIZE	**0.092**	-0.041	**-0.111**	**0.109**		**-0.225**	**0.395**	**0.110**	0.020	**0.086**	**0.070**
(6)	ROA	**0.144**	**0.179**	**0.174**	-0.010	0.023		**-0.181**	**0.098**	**0.115**	**0.384**	**0.094**
(7)	LEV	**0.153**	0.048	**0.065**	-0.029	**0.489**	**-0.088**		**0.074**	**-0.110**	**0.171**	-0.030
(8)	INTANG	**0.100**	**0.094**	0.044	**0.093**	0.040	0.022	**-0.068**		**-0.192**	0.052	**0.087**
(9)	CAPINT	0.008	**-0.134**	**-0.145**	-0.037	-0.022	0.029	**-0.153**	**-0.269**		**-0.073**	**0.112**
(10)	MKTBK	0.013	**0.145**	-0.041	**-0.055**	-0.036	**0.175**	0.028	0.035	**-0.076**		**0.091**
(11)	RND	**-0.061**	-0.014	**-0.092**	0.051	**-0.156**	**-0.273**	**-0.117**	0.027	**-0.093**	**0.226**	

Table 1.5: Effective tax rates for sample groups before and after 1 July 2000

This table reports the means and the difference in means for CETR. The sample period is 1997-2004. The pre-period is defined as the years prior to the new rule being implemented effective 1 July 2000 (1997, 1998, 1999, 2000) while the post-period is defined as the years after the new rule was implemented (2001, 2002, 2003, 2004). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Tax avoidance proxy = CETR

Group	Mean (Pre)	Mean (Post)	Difference	*t*-stat	*p*-value
(a) Full sample *n*=1,901	0.537 *n*=938	0.624 *n*=963	0.087***	2.77	0.006
(b) Domestic firms *n*=1,655	0.522 *n*=812	0.610 *n*=843	0.088***	2.64	0.008
(c) Foreign firms *n*=246	0.635 *n*=126	0.722 *n*=120	0.087	0.94	0.349
(d) Domestic dividend-paying firms *n*=1,109	0.708 *n*=552	0.855 *n*=557	0.147***	3.65	0.000
(e) Domestic non-dividend-paying firms *n*=546	0.125 *n*=260	0.134 *n*=286	0.009	0.23	0.820
(f) Domestic firms where all dividends paid are fully-franked *n*=779	0.812 *n*=377	0.999 *n*=402	0.187***	4.15	0.000
(g) Domestic firms where at least one dividend paid is fully-franked *n*=846	0.814 *n*=414	0.979 *n*=432	0.165***	3.77	0.000

(a) = (b) + (c)
(b) = (d) + (e)

Table 1.6: Corporate tax avoidance following changes to the imputation system

This table reports the results from estimating Equation (1) from 1997 to 2004 using OLS. The sample consists of domestic firms (treatment group) and foreign firms (control group). All variables are defined in Appendix B. Coefficient estimates are presented with *p*-values reported in parentheses. The *p*-values are based on heteroscedasticity robust standard errors and standard errors are clustered at the firm-level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Domestic firms (treated) and foreign firms (control)

Dep. Var.		$CETR_t$	
Variables	Pred.	(1)	(2)
$TREATED_t$		-0.018	-
		(0.81)	-
$TREATED_t*POST_t$	+	0.034	0.042
		(0.689)	(0.627)
$SIZE_t$		0.047***	0.098***
		(0.000)	(0.006)
ROA_t		0.482***	0.140**
		(0.000)	(0.035)
LEV_t		0.309***	0.022
		(0.009)	(0.854)
$INTANG_t$		0.325**	0.062
		(0.013)	(0.699)
$CAPINT_t$		0.086	0.069
		(0.366)	(0.484)
$MKTBK_t$		0.004	-0.002
		(0.353)	(0.715)
RND_t		-0.405*	-0.215
		(0.061)	(0.128)
Intercept		-0.270	-0.960***
		(0.440)	(0.008)
Industry FE		Y	N
Firm FE		N	Y
Year FE		Y	Y
Observations		1,901	1,901
Adj. R^2		0.169	0.366

Table 1.7: Corporate tax avoidance following changes to the imputation system

This table reports the results from estimating Equation (1) from 1997 to 2004 using OLS. The sample consists of domestic dividend-paying firms (treatment group) and foreign firms (control group). All variables are defined in Appendix B. Coefficient estimates are presented with *p*-value reported in parentheses. The *p*-value are based on heteroscedasticity robust standard errors and standard errors are clustered at the firm-level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Domestic dividend-paying firms (treated) and foreign firms (control)

Dep. Var.		$CETR_t$	
Variables	Pred.	(1)	(2)
$TREATED_t$		-0.004	-
		(0.962)	-
$TREATED_t*POST_t$	+	0.067	0.074
		(0.464)	(0.447)
$SIZE_t$		-0.005	0.126*
		(0.739)	(0.064)
ROA_t		0.810***	0.146
		(0.000)	(0.526)
LEV_t		0.662***	-0.159
		(0.000)	(0.553)
$INTANG_t$		0.375**	-0.097
		(0.014)	(0.707)
$CAPINT_t$		0.212*	-0.012
		(0.089)	(0.952)
$MKTBK_t$		-0.002	0.001
		(0.644)	(0.875)
RND_t		0.009	-0.0356
		(0.982)	(0.373)
Intercept		0.252	-0.563
		(0.265)	(0.525)
Industry FE		Y	N
Firm FE		N	Y
Year FE		Y	Y
Observations		1,355	1,355
Adj. R^2		0.071	0.243

Table 1.8: Corporate tax avoidance following changes to the imputation system

This table reports the results from estimating Equation (1) from 1997 to 2004 using OLS. The sample consists of domestic dividend-paying firms (treatment group) and domestic non-dividend-paying firms (control group). All variables are defined in Appendix B. Coefficient estimates are presented with *p*-values reported in parentheses. The *p*-values are based on heteroscedasticity robust standard errors and standard errors are clustered at the firm-level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. †††, ††, and † denotes statistical significance at the 1%, 5%, and 10% levels, respectively, using a one-tailed test when we have a prediction and the sign of the coefficient is consistent with the prediction.

Domestic dividend-paying firms (treated) and domestic non-dividend-paying firms (control)

Dep. Var.		$CETR_t$	
Variables	Pred.	(1)	(2)
$TREATED_t$		0.403***	-
		(0.000)	
$TREATED_t$*$POST_t$	+	0.101†	0.137††
		(0.146)	(0.040)
$SIZE_t$		0.016	0.070*
		(0.218)	(0.059)
ROA_t		0.277***	0.163**
		(0.000)	(0.014)
LEV_t		0.308***	0.0616
		(0.005)	(0.606)
$INTANG_t$		0.381***	0.085
		(0.004)	(0.635)
$CAPINT_t$		0.020	0.177*
		(0.838)	(0.090)
$MKTBK_t$		0.004	-0.003
		(0.400)	(0.711)
RND_t		-0.163	-0.216
		(0.371)	(0.134)
Intercept		-0.117	-0.643*
		(0.493)	(0.091)
Industry FE		Y	N
Firm FE		N	Y
Year FE		Y	Y
Observations		1,655	1,655
Adj. R^2		0.242	0.387

Table 1.9: Corporate tax avoidance following changes to the imputation system

This table reports the results from estimating Equation (1) from 1997 to 2004 using OLS. In Models (1) and (2), the sample consists of domestic firms where at least one dividend paid is fully-franked (treatment group) and domestic firms where no dividends paid are fully-franked (control group). In Models (3) and (4), the sample consists of domestic firms where all dividends paid are fully-franked (treatment group) and domestic firms where all dividends are not fully-franked (control group). All variables are defined in Appendix B. Coefficient estimates are presented with *p*-values reported in parentheses. The *p*-values are based on heteroscedasticity robust standard errors and standard errors are clustered at the firm-level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. †††, ††, and † denotes statistical significance at the 1%, 5%, and 10% levels, respectively, using a one-tailed test when we have a prediction and the sign of the coefficient is consistent with the prediction.

Dep. Var.		$CETR_t$			
Variables	Pred.	(1)	(2)	(3)	(4)
$TREATED_t$		0.400***	-	0.306***	-
		(0.000)		(0.000)	
$TREATED_t$*$POST_t$	+	0.118†	0.261††	0.176††	0.273†††
		(0.20)	(0.035)	(0.058)	(0.011)
$SIZE_t$		0.011	0.125	0.014	0.128
		(0.529)	(0.151)	(0.430)	(0.141)
ROA_t		0.837***	0.466	0.889***	0.464
		(0.000)	(0.140)	(0.000)	(0.143)
LEV_t		0.527***	-0.246	0.544***	-0.253
		(0.005)	(0.495)	(0.004)	(0.497)
$INTANG_t$		0.316*	-0.166	0.313*	-0.197
		(0.053)	(0.608)	(0.055)	(0.545)
$CAPINT_t$		0.094	0.304	0.093	0.295
		(0.521)	(0.300)	(0.534)	(0.320)
$MKTBK_t$		-0.005	0.005	-0.005	0.005
		(0.419)	(0.688)	(0.439)	(0.652)
RND_t		-1.889**	-0.290	-1.510*	-0.298
		(0.031)	(0.883)	(0.095)	(0.879)
Intercept		-0.102	-0.537	-0.059	-0.590
		(0.663)	(0.634)	(0.800)	(0.602)
Industry FE		Y	N	Y	N
Firm FE		N	Y	N	Y
Year FE		Y	Y	Y	Y
Observations		1,109	1,109	1,109	1,109
Adj. R^2		0.140	0.252	0.132	0.254

1.8 Appendix A: Illustrative example

Two identical debt-free firms exist in two countries that differ only in their shareholder dividend tax policies. Taxable income is assumed to equal book income. The company tax rate is 30%. All profits after tax are paid out as dividends. Panel A compares the after-tax outcomes for shareholders (shareholder level tax rate = 40%) and the total tax paid on the income of each company operating under an imputation versus classical dividend system. Panel B reports the effect that a dividend imputation system has on different types of resident shareholders with different marginal tax rates (0% - 47%). The effect is shown before and after the change effective 1 July 2000.

Panel A: Comparison of imputation and classical systems

	Imputation	Classical
Corporate financial reporting level		
Net profit before tax	$100	$100
Less: company tax (30%)	($30)	($30)
Net profit after tax (available to shareholders)	*$70*	*$70*
Corporate tax return level		
Taxable income	$100	$100
Company tax (30%)	*$30*	*$30*
Shareholder level		
Dividend received by shareholder	$70	$70
Gross-up for franking credit (*)	$30	$0
Taxable income	$100	$70
Tax on taxable income (40%)	$40	$28
Less: franking credit (*)	($30)	($0)
Net shareholder level tax payable	*$10*	*$28*
Shareholder after-tax income	*$60*	*$42*
Total tax paid		
Tax paid by company	$30	$30
Tax paid by shareholder	$10	$28
Total	*$40*	*$58*

(*) Under Section 207-20 of the *ITAA 1997*, the assessable income of a shareholder includes the amount of the franking credit and then the shareholder is entitled to a tax offset equal to the franking credit.

Panel B: Impact on shareholder-level tax liabilities under an imputation system

	Investor 1	Investor 2	Investor 3	Investor 4
Pre-1 July 2000				
Shareholder level				
Cash dividend received	$70	$70	$70	$70
Gross-up for franking credit	$30	$30	$30	$30
Taxable income	*$100*	*$100*	*$100*	*$100*
Tax rate	0%	15%	30%	47%
Tax payable	$0	$15	$30	$47
Less: franking credit	($0)	($15)	($30)	($30)
Net tax payable/(receivable)	$0	$0	$0	$17
Post-tax dividend income	*$70*	*$70*	*$70*	*$53*
Post-1 July 2000				
Shareholder level				
Cash dividend received	$70	$70	$70	$70
Gross-up for franking credit	$30	$30	$30	$30
Taxable income	*$100*	*$100*	*$100*	*$100*
Tax rate	0%	15%	30%	47%
Tax payable	$0	$15	$30	$47
Less: franking credit	$30	$30	$30	$30
Net tax payable/(receivable)	*($30)*	*($15)*	*$0*	*$17*
Post-tax dividend income	*$100*	*$85*	*$70*	*$53*

1.9 Appendix B: Variable definitions

Variable name	Mnemonic	Definition
Cash effective tax rate	CETR	Income tax paid from the cash flow statement in year *t* divided pre-tax net income in year *t*. The ratio is then divided by the statutory corporate tax rate prevailing in year *t*
Cash effective tax rate - modified	CETR_M	Income tax paid from the cash flow statement in year *t* divided by net cash flows from operating activities plus income tax paid from the cash flow statement in year *t*. The ratio is then divided by the statutory corporate tax rate prevailing in year *t*
Treatment firms	TREATED	Dummy variable that equals 1 for firms receiving treatment, and 0 otherwise. Treatment firms include domestic firms, domestic dividend-paying firms, domestic firms where all dividends paid are fully-franked, and domestic firms where at least one dividend paid is fully-franked
Year of change of franking credit legislation	POST	Dummy variable for the year of change in legislation; equals 1 for financial years ending 30 June 2001 and onward, and 0 otherwise
Year prior to change in franking credit legislation	POST_1999	Dummy variable for the year prior to change in legislation; equals 1 for financial years ending 30 June 2000 and onward, and 0 otherwise
Firm size	SIZE	Natural logarithm of total assets
Profitability	ROA	Pre-tax net income divided by total assets
Leverage	LEV	Total liabilities divided by total assets
Intangible assets	INTANG	Net intangible assets divided by total assets
Capital intensity	CAPINT	Net property, plant and equipment divided by total assets
Market-to-book ratio	MKTBK	Market value of equity divided by common equity
Research & development intensity	RND	Research and development expenditure divided by revenues

Chapter 2

The impact of mandatory public country-by-country tax disclosures on the tax aggressiveness of European Union financial institutions

2.1 Introduction

International tax issues have been thrust towards the top of the political agenda in recent years as governments battle to protect their tax revenue base and preserve tax system integrity in the aftermath of the financial crisis.[1] Recent scandals such as the 'Panama Papers' and 'Lux Leaks' has attracted censure from the press, public interest groups, politicians and global organisations such as the G20 and OECD.[2] These scandals occurred during a period in which initiatives were being introduced globally to combat aggressive tax avoidance including the OECD's wide-ranging Base Erosion and Profit Shifting (BEPS) reforms (OECD 2015). However, despite a rapidly evolving academic literature on the determinants and consequences of corporate tax avoidance (Hanlon and Heitzman 2010), relatively little is known about how firms respond to an increase in transparency from mandatory disclosure of their tax affairs. In this study, an exogenous shock to the disclosure requirements of European Union (EU) banks is used to investigate whether *mandatory public* country-by-country tax disclosures induce changes in firms' corporate tax avoidance.[3]

[1] Corporate income tax revenue for the EU Member States averaged 2.5% of GDP in 2013 (Eurostat 2015). The EU loses €50-70bn in annual revenues due to corporate tax avoidance (Dover et al. 2015).
[2] In 2016, an unprecedented leak of more than 11 million documents from Panama law firm Mossack Fonseca revealed large scale tax avoidance. See, for example, 'Panama Papers: How assets are hidden and taxes dodged', available at: http://bbc.co.uk/news/business-35943740. In 2014, a cache of leaked tax documents uncovered preferential tax deals struck by around 400 multinational corporations and Luxembourg's tax authority. See, for example, 'Luxembourg tax files: how tiny state rubber-stamped tax avoidance on an industrial scale', available at: http://www.theguardian.com/business/2014/nov/05/-sp-luxembourg-tax-files-tax-avoidance-industrial-scale.
[3] The new disclosure requirements apply to 'credit institutions and investment firms' operating in the EU. For brevity, I use the terms 'EU banks' or 'EU financial firms' throughout the chapter to describe these firms.

Firms seek to maximise after-tax profits and thus tax minimisation, although considered by some as morally questionable, is a common strategy and permissible if conducted within the boundaries of the law. However, firms face a delicate risk-reward trade-off between the costs and benefits of tax planning.[4,5] On the one hand, the management of costs, including taxes, is an essential element of a firm's business strategy, the disclosure of which may be viewed positively by investors if the firm is compliant with tax laws meaning risk is low (Dyreng et al. 2017a). On the other hand, increased transparency of tax activities may be viewed negatively if public disclosure is expected to increase proprietary costs or lead to allegations of illegal tax evasion resulting in reputational damage and audit penalties (Graham et al. 2014; EY 2015).

Large multinational corporations (MNCs) such as Apple, Google, and Amazon, have been accused of exploiting grey areas of international tax law (Bradshaw et al. 2014; Garside 2014; Houlder 2016). The tax justice debate has shifted to a new level with many expressing concerns that MNCs do not pay their 'fair share' of tax and enjoy societal benefits without adequately paying for them. Two key concerns are tax haven involvement and the misalignment between the economic substance of transactions and the country in which they are reported for tax purposes. Furthermore, many financial firms who received large taxpayer-funded government handouts during the financial crisis have been criticised for not paying an equitable amount of tax by recouping tax losses largely generated during the crisis (Bowers 2015).[6]

In response to the public outcry, and with the stated objective of restoring public trust in the financial services sector, the European Commission (EC) introduced a requirement in 2013 that banks operating in the EU must annually publish certain tax-related financial information on a country-by-country basis. This country-by-country-reporting (CBCR) requirement was a *late and unanticipated* inclusion within the broad

[4] To avoid the complexity of determining the legality or appropriateness of a particular tax minimisation strategy, I define tax avoidance per Hanlon and Heitzman (2010) as a broad range of strategies undertaken by a firm to reduce its cash tax obligations. Difficulties arise when delineating between activities regarded as legal tax planning and those outside the bounds of the law (e.g., tax evasion). Between legal tax planning and tax evasion, a vast grey area exists which often requires lengthy court cases to adjudicate which side of the law an aggressive tax strategy lies. The terms 'tax aggressiveness', 'tax avoidance' and 'aggressive tax planning' are used interchangeably throughout the chapter.

[5] I do not infer or imply that the sample firms are engaging in any illegal or improper behaviour.

[6] Merz and Overesch (2016) find that the magnitude of the tax sensitivity of reported profits of MNC banks' subsidiaries is significantly larger than the effects found in prior studies for non-financial firms and conclude that banks have enhanced tax planning opportunities.

Capital Requirements Directive IV (CRD IV) adopted by the EU to implement the Basel III banking reforms.

Generally, EU firms must prepare their consolidated financial statements in accordance with International Financial Reporting Standards (IFRS). Per International Accounting Standard 12 *Income Taxes*, firms must disclose information regarding current and future tax payments and tax-related assets and liabilities in the primary financial statements and the footnotes thereto. However, due to the requirements of IFRS 8 *Operating Segments*, this information is usually only available at the consolidated level, not at the country level. Under the management approach in IFRS 8, managers have discretion in determining what is disclosed in segment reports and whether operating segments are based on product or service lines, geography, legal entity, customer type, or any combination of these. In contrast, CBCR stipulates the *public* disclosure of turnover, profits, taxes, and employee numbers, for *each country* the firm operates in, along with information concerning individual subsidiaries and branches (entities).[7] Therefore, the CBCR obligations for EU banks exceed the requirements of the accounting standards.[8]

Motivated by the heightened scrutiny of EU banks' tax arrangements, I exploit the unanticipated introduction of mandatory public CBCR to examine whether improved transparency induces changes in the cost-benefit equilibrium of tax avoidance. If additional transparency increases the costs to such an extent that they outweigh the benefits, then a reduction in tax avoidance is expected, and vice versa. Alternatively, if the tax strategies already implemented are perfectly legal, then increased transparency may not affect behaviour at all. Indeed, many accused MNCs maintain that their tax strategies, albeit complex, are fully compliant with existing tax law. Understanding any impact of CBCR is important because it provides policy makers with important empirical evidence on the consequences of mandatory public dissemination of tax information and may assist with the setting of future reporting requirements. Furthermore, it provides additional insights into potential real effects of mandatory disclosure that exceeds accounting standards (Leuz and Wysocki 2016).

[7] To be clear, the information disclosed is financial accounting information, not tax return information.
[8] Bushman (2014) notes the tension created by the differing objectives of accounting standard setting versus bank regulation.

I begin by examining whether EU banks change the amount of tax avoidance they undertake in response to the new CBCR requirements.[9] I conduct a range of empirical tests using cash and book ETRs to proxy for tax avoidance and based on a hand-collected sample of 72 firms, I do not find any evidence of a reduction in tax avoidance in response to increased transparency. Cross-sectional tests reveal that unlisted EU banks *increase* their tax avoidance after CBCR. A similar result is found when a difference-in-differences research design is employed to test for any change in tax avoidance of EU banks relative to a control group of EU insurers. In fact, in some tests, I find that on average, EU banks *increased* their tax avoidance relative to EU insurers despite increased disclosure levels. Next, I exploit the unique CBCR data to develop new measures of tax haven involvement and examine any changes in the intensity of tax haven use by EU banks in the years after CBCR. I find no statistically significant change in the proportion of turnover or profit before tax recognised in tax havens during the post-CBCR period, but I do find a significant decrease in the proportion of tax haven entities for listed EU banks.

In support of arguments that a disconnect exists between the location of profits recognised for tax purposes and the location of real operations, additional tests show that while turnover is a key determinant of pre-tax profits recognised in tax havens, the proportion of employees in tax havens is not.[10] I also show that the reduction in the number of tax haven entities observed since 2013 is driven by the decrease in the total number of entities, consistent with EU banks eliminating tax haven entities in line with real changes to their corporate structure. An examination of short-window market-adjusted returns around several key CBCR-related events lends support to the claim that equity market participants anticipate negative consequences for EU banks, however the negative abnormal returns are temporary. Finally, I perform a battery of robustness tests including the use of alternative tax avoidance and tax haven proxies and the results are qualitatively similar. Overall, the findings are consistent with the benefits of tax avoidance in the post-CBCR period remaining greater than, or equal to, the potential costs, for EU banks.

[9] The main goal of this study is to examine any *changes* in tax avoidance *after* CBCR was introduced not to quantify the amount of tax avoidance (if any) undertaken by EU financial firms.
[10] Unfortunately, the CBCR requirements do not include an obligation to disclose assets by country. This would provide another key indicator of the extent of real operations located in tax havens.

This study contributes to the literature in several ways. First, to the best of my knowledge, this study is the first to empirically investigate the association between mandatory public CBCR and corporate tax avoidance. Thus, it extends the emerging literature examining how firms respond to public scrutiny of their tax practices (Gallemore et al. 2014; Dyreng et al. 2016). Second, by examining the effects of mandatory CBCR on the behaviour of EU banks, this study adds to the literature suggesting that changes in disclosure policies may have real consequences (Kanodia and Sapra 2016). Third, this study extends prior research investigating the relation between geographic financial disclosures and tax avoidance (Hope et al. 2013; Akamah et al. 2018). Fourth, I add to the literature examining tax avoidance behaviour of non-US firms (Atwood et al. 2012; Markle and Shackelford 2012a, 2012b; Dyreng et al. 2016). Finally, the paucity of evidence on the taxation of financial firms stems from concerns about regulatory differences and their extensive use of off-balance sheet debt and complex financial instruments (Hanlon and Heitzman 2010).[11] Consequently, I address this void in the literature. The findings should also inform bank regulators and global policy makers as they continue to develop initiatives designed to curb corporate tax avoidance. Moreover, the results are timely given the EC's current intention to extend *public* CBCR to firms in *all* industries.

2.2 Background and hypothesis development

2.2.1 Corporate tax avoidance and MNCs

A growing literature documents determinants of corporate tax avoidance along with a variety of financial reporting, capital market, and contracting outcomes associated with such activities (Hanlon and Heitzman 2010; Graham et al. 2012). Prior studies show that MNCs shift profits into low-tax jurisdictions (Huizinga and Laeven 2008), strategically set transfer prices for intra-firm sales (Clausing 2003), develop cost-sharing agreements between subsidiaries (Martin 2013), and structure internal debt to exploit tax rate differentials across countries (Huizinga et al. 2008). They also

[11] Furthermore, financial firms are inherently more opaque than non-financial firms because their leverage and risk are imperfectly observable (Beatty and Liao 2014; Bushman 2014; and Acharya and Ryan 2016). The exclusion of these firms from many samples is unfortunate given the crucial role they play in a country's financial infrastructure. Through the provision of financial intermediation between depositors and borrowers and as the primary backstop providers of liquidity, banks are critical to the efficient functioning of the economy.

transfer hard-to-value intangible assets (e.g., trademarks, brand names) to low-tax subsidiaries to facilitate high intra-firm royalties and licence fees (Collins and Shackelford 1997; Grubert 2003; Karkinsky and Riedel 2012; Griffith et al. 2014), and engage in tax 'treaty shopping' to take advantage of differences in tax residence definitions across countries resulting in very low or no taxation (Ting 2014).

Another strategy employed by MNCs is the utilisation of tax havens, commonly associated with very low or zero taxes, corporate anonymity, light regulatory touch, favourable legal environments, and secrecy.[12] Zucman (2014) estimates that by 2013 approximately 20% of US corporations' profits were booked in tax havens, a tenfold increase since the 1980s. The use of tax havens is well documented in the literature.[13] Both Dyreng and Lindsey (2009) and Markle and Shackelford (2012b) find lower ETRs for MNCs with tax haven operations. However, despite widespread public concern about tax havens (Shaxson 2012; Zucman 2015), some proponents claim they are beneficial. Tax havens may improve the efficiency of global markets by smoothing investment flows, drive taxes lower, ensure that MNCs are not taxed twice on the same income, and promote investment and economic activity (Desai et al. 2006; Dharmapala 2008; Hong and Smart 2010; Hines 2010a).

While banks are often associated with the aforementioned tax minimisation methods, they rely on additional strategies to shift profits, as outlined by Merz and Overesch (2016). Specifically, profit margins of bank subsidiaries are influenced by the functions performed and risks assumed by them. For example, profit apportionment of a multinational bank depends on the allocation of functions like credit management, investment analysis, and underwriting. Other activities such as trading or asset management are potentially highly mobile enabling profits to be easily shifted to low-tax jurisdictions. Furthermore, distribution of taxable profits across subsidiaries is affected by the allocation of interest and liquidity risks, intrafirm guarantees that transfer credit risks, as well as the hedging of exchange rate risks and

[12] The definition of what constitutes a tax haven is unclear and no universally agreed upon definition exists. However, the OECD defined the features of tax havens as low or no taxes, lack of effective information exchange and transparency, and no requirement for substantial real operating activity (OECD 1998). In my primary analysis, I follow Dyreng et al. (2015) who use the list of tax havens in Dyreng and Lindsey (2009) but add Hong Kong and the Netherlands because these jurisdictions are widely viewed as tax havens. Appendix B provides a list of the jurisdictions deemed tax havens. Some tax havens are not countries (e.g., Jersey is a British Crown Dependency). The terms 'country' and 'jurisdiction' are used interchangeably throughout the chapter.

[13] See for example, Hines and Rice (1994); Dharmapala and Hines (2009); Gravelle (2009).

market risks. Finally, banks can manipulate transfer prices for intra-firm financial transactions including interest margins or service fees.

Moreover, globalisation and the growing importance of intangible assets as a value-driver combine with an outdated international tax framework, to generate gaps and anomalies that can be exploited via dexterous tax planning. The OECD (2013a) highlights that the very nature of intangible assets allows them to be shifted easily. It also acknowledges the upsurge in globalisation as an underlying factor fostering corporate tax avoidance because transactions that previously relied on physical proximity to a market can now be undertaken anywhere (OECD 2013a).[14] Enforcing arms-length principles for intangibles is problematic due to difficulties in establishing whether transfer prices accurately reflect the underlying economic reality of transactions. Finally, while MNCs are complex global businesses, taxation is levied and enforced at the national level. The international tax architecture is built upon an intricate network of tax principles including source and residence, worldwide and territorial approaches to international taxation, arm's length pricing, and the division of taxing rights between countries via bilateral tax treaties.[15] The concern is that this complex framework, designed in the early twentieth century, has not kept pace with changes in global business practices in the digital economy era.

2.2.2 Regulatory response to corporate tax avoidance

A key constraint inhibiting stakeholders from accurately assessing a firm's tax position is the lack of granular disclosure of relevant information. In recent years, tax reform proposals include the idea that MNCs should publish in their annual financial statements, a profit and loss account, and limited balance sheet and cash flow information for *every* jurisdiction in which they operate.[16] CBCR was first proposed

[14] Trade barrier removal, rapid developments in information and communication technology, and increased mobility of capital and labour, has had an important impact on the way MNCs are structured and managed. In fact, a firm may be heavily involved in the economic life of another country by doing business with their citizens via the internet, without having a taxable presence there.

[15] Tax treaties are the primary mechanism by which transfer pricing is addressed to ensure that appropriate valuations apply to cross-border transactions between related parties.

[16] Other proposals include: (i) taxation by the MNCs residence country of its consolidated worldwide profits, with a credit given for foreign taxes paid (Kleinbard 2011); (ii) a Destination Based Corporate Tax (Devereux and de la Feria 2014); (iii) the EU's proposed Common Consolidated Corporate Tax Base; and (iv) unitary taxation with formulary apportionment (Avi-Yonah et al. 2009; Picciotto 2016). The latter approach treats MNCs as single entities for taxation purposes (unitary taxation) and allocates profits to each entity within the group using economic factors such as physical assets, sales, employees (formulary apportionment). The basic premise is to treat MNCs according to the economic reality that

by Murphy (2003) who argued that general purpose financial statements prepared in accordance with accounting standards were not suitable for tax authority use. This proposal, and another from the Publish-What-You-Pay (PWYP) coalition (PWYP 2005), were submitted to the International Accounting Standards Board (IASB) during its public consultation on standards for the extractive industries and segment reporting, respectively, but were largely disregarded (Wojcik 2015).[17] Subsequently, a more detailed submission was made by Murphy and the Tax Justice Network (TJN) to the EC during its consultation on CBCR in 2010 (Murphy and TJN 2010).[18,19] This proposal and a follow-up version (Murphy and TJN 2012), essentially treated CBCR as an extension of corporate financial reporting. The intention was to create more comprehensive and comparable accounting data to help investors better assess risks, improve tax governance, and increase MNC accountability.[20]

2.2.2.1 OECD Base Erosion and Profit Shifting (BEPS) initiative

Historically, most governments unilaterally rely upon countermeasures such as thin capitalisation rules, transfer pricing rules, and broad general anti-avoidance rules to restrain aggressive tax planning. However, the global financial crisis led to calls for an internationally coordinated response to address the abusive exploitation of tax law loopholes and ensure that profits are taxed where economic activity takes place. So, at the request of the G20, the OECD developed the BEPS project in 2013 (OECD 2013a, 2013b) with the final recommendations delivered in 2015 (OECD 2015).[21] Action Item 13 contains rules regarding transfer pricing documentation which among

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they are highly integrated and centrally directed firms and their profits should be attributed across the group according to each entity's contribution to value creation through its functions performed, assets used, and risks assumed (Picciotto 2016). This method is used for state taxes in Canada, Switzerland and the US (Clausing 2016). However, Hines (2010b) provides evidence from European firms that apportionment formulas significantly misattribute income, since factors (property, employment, sales) on which they are based, do a poor job of explaining profits.

[17] Publish-What-You-Pay is an international coalition of civil society organisations that advocates for financial transparency in the extractive industry.

[18] This submission called for 'full CBCR', that is, the reporting of third-party and intra-group sales, purchases, assets, liabilities, employee numbers, names of related entities, tax payments and other payments to governments, on a country-by-country basis (Murphy and TJN 2010).

[19] The Tax Justice Network is an international non-profit organisation dedicated to promoting tax reform concerning tax avoidance, especially in poorer countries.

[20] In a December 2012 report, the IASB postponed CBCR deliberations to a future unspecified date (http://www.internationaltaxreview.com/Article/3133003/IASB-rejects-new-accounting-standard-for-income-taxes-and-country-by-country-reporting.html).

[21] The final report was adopted by the OECD Council on 1 October 2015, endorsed by G20 Finance Ministers on 8 October 2015, and endorsed by G20 Leaders at the summit on 15-16 November 2015.

other things requires MNCs to submit a CBCR to tax authorities. It must include information on the allocation of income, business activities and taxes paid, by tax jurisdiction. Importantly, the OECD endorsed-CBCR is designed as a risk management tool for tax authorities and not a public disclosure regime.[22] CBCR data will be shared between tax administrations through treaty provisions.

2.2.2.2 Extractive Industries Transparency Initiative (EITI)

Created in 2002, the EITI is a global standard to improve transparency and accountability of revenues from natural resources and is overseen by the EITI Board comprising members from governments, companies, and civil society.[23] Governments adopt the EITI *voluntarily*, but most implementing countries enacted this commitment into law thereby making EITI reporting *mandatory*. All extractive companies operating in an EITI implementing country are required to disclose payments made to that country's government (e.g., taxes, licences, royalties), and the government discloses how much they receive from extractive companies operating in their country. Payments are matched and reconciled by an independent administrator and then disclosed *publicly* in an annual 'EITI Report'. In July 2012, the US Congress passed Section 1504 of the Dodd-Frank Act implementing the EITI requirements for US listed extractive companies.[24] Similarly, amendments to the EU Accounting and Transparency Directive 2013/34/EU in July 2013, force all EU (listed and large non-listed) extractive companies to publish their payments on a country and project basis.[25]

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[22] Several countries have already implemented this non-public CBCR including the UK (*Taxes (Base Erosion and Profit Shifting) (Country-by-Country Reporting) Regulations 2016*).

[23] The EITI is a non-profit association established under Norwegian law. Over 90 of the world's largest oil, gas and mining companies have elected to become 'EITI Supporting Companies' and over 80 global investment institutions, that collectively manage over US$19 trillion, have signed the 'Investors' Statement on Transparency in the Extractive Sector' in support of the EITI. See http://eiti.org.

[24] The *Dodd-Frank Wall Street Reform and Consumer Protection Act 2008* ('Cardin-Lugar Amendment') requires US listed companies who engage in the commercial development of oil, gas and other minerals (defined as exploration, extraction, processing, and export), to disclose data on payments over US$100,000 to the US and foreign governments in all countries where they operate. This information is to be disclosed annually by filing a new form (Form SD) with the Securities and Exchange Commission (SEC). These companies must report the type and total amount of payments made for each project and to *each government* including *taxes*, royalties, fees (including license fees), production entitlements and bonuses. However, the rules were successfully challenged in the US District Court for the District of Columbia on 2 July 2013 by a coalition of industry groups and are currently suspended until the SEC introduces revised rules.

[25] EU countries completed transposition of the Directives in 2015 and rules are applicable for financial years commencing on or after 1 January 2016. Public disclosure is required for any single payment or series of related payments if it exceeds €100,000 within a financial year.

2.2.2.3 Country-by-Country Reporting for EU financial firms

In July 2013, CRD IV[26] was adopted by the EU Parliament and Council. Article 89 of CRD IV contains the CBCR requirements for EU financial institutions.[27, 28] It applies to all EU headquartered financial institutions, their subsidiaries established outside the EU, and EU subsidiaries of institutions headquartered outside the EU. Firms subject to these requirements must disclose the following data on a country-by-country basis: (i) name(s), nature of activities and geographical location; (ii) turnover; (iii) number of employees on a full-time equivalent basis; (iv) profit or loss before tax; (v) corporation tax paid; and (vi) public subsidies received. Global Systemically Important Banks (GSIBs)[29] were required to report items (i) to (vi) for 2013 by 1 July 2014. Items (i) to (iii) were required to be publicly disclosed and items (iv) to (vi) privately disclosed to the EC. All other EU financial firms were required to publicly disclose all six items for 2014 in 2015 but had to publicly disclose items (i) to (iii) for 2013 by 1 July 2014. CBCR disclosures may be prepared on a consolidated basis and can be published in firms' annual financial statements or on their website, provided the data is easily accessible. Disclosures are required to be audited from 2015 (i.e., based on 2014 data). An example CBCR is provided in Appendix A.

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[26] The new regulatory framework is the EU implementation of Basel III, a global agreement by the Basel Committee on Banking Supervision in response to the financial crisis. Basel III contains a package of proposals to increase the prudential soundness of banks. It consists of a Directive (CRD IV) and a Regulation (CRR): (i) CRD IV (Directive 2013/36/EU) of the EU Parliament and Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, and (ii) CRR (Regulation (EU) No 575/2013) on prudential requirements for credit institutions and investment firms. The Directive was to be transposed into domestic law by the 28 EU Member States by 31 December 2013, while the Regulation applies automatically in all Member States from the date of entry into force (17 July 2013).

[27] 'Institutions' are defined as 'credit institutions' and 'investment firms'. Credit institutions are 'an undertaking the business of which is to receive deposits or other repayable funds from the public and to grant credits on their own account' (CRR Title I Article 4.1(1)). Essentially, retail and commercial banking entities with deposit taking permission will fall into scope. Investment firms are 'any legal person whose regular occupation or business is the provision of one or more investment services to third parties and/or performance of one or more investment activities on a professional basis' as defined in Article 4(1)(1) of Directive 2004/39/EC (MiFID) (CRR Title I Article 4.1(2)). Such activities include order execution for clients, dealing on own account, portfolio management and investment advice.

[28] As at 30 June 2014, only 13 Member States had fully implemented Article 89 and 4 had implemented it for either credit institutions or investment firms (PwC, 2014). Christensen et al. (2016) discuss the legislative and administrative process in the EU and the advantages of using the EU setting including the fact that variation in the Directives entry-into-force dates across EU Member States can be viewed as plausibly exogenous. However, despite differences in implementation dates across EU countries, 70 of the 72 sample firms provided full CBCR disclosures for the 2014 year.

[29] EU GSIBs are: Barclays, BNP Paribas, BBVA, Deutsche Bank, Groupe BPCE, Group Credit Agricole, HSBC, ING Bank, Nordea, Royal Bank of Scotland, Santander, Societe Generale, Standard Chartered, Unicredit. BBVA was not classified as a GSIB in 2016.

Recital 52 to CRD IV states the objective of mandatory public CBCR as 'restoring the trust of EU citizens in the financial services sector in the wake of the global financial crisis'. This implies that trust was broken by EU financial firms not paying corporate taxes that reflect their true economic presence in each country they operate in. *Public* CBCR ensures that all stakeholders including institutional and retail investors, financial analysts, tax-watchdog groups, and the public, receive richer information concerning the tax arrangements of MNCs beyond that previously provided in public financial statements.[30] In response to concerns, Paragraph 3 of Article 89 required the EC to conduct a general assessment regarding the potential negative economic consequences of public CBCR by 31 December 2014. The assessment concluded that CBCR was unlikely to have a significant negative economic impact and could have a small positive economic impact (PwC 2014). A survey of 156 stakeholders including civil society organisations, regulators, and banks, revealed they expect the new rules to increase the transparency of, and public confidence in, the financial sector (PwC 2014).

2.2.2.4 Recent tax transparency initiatives

On 12 April 2016, the EC presented a proposal for a directive which would require annual public CBCR by companies in *all industries* with consolidated turnover exceeding €750 million operating in the EU.[31] The proposal's objective posits that greater transparency is needed and public scrutiny can help ensure that tax is paid where profits are produced. The required disclosures are identical to those currently required of EU banks under Article 89 of CRD IV. The EC anticipates that around 6,000 businesses will be affected, only a third of which are headquartered in the EU.[32] If passed into legislation, this proposal will amend Accounting Directive 2013/34/EU.[33]

The EC published another draft EU Directive on 25 October 2016 called the Common Consolidated Corporate Tax Base (CCCTB).[34] The CCCTB proposes to

[30] At a practical level, tax practices, liabilities and risks need to be assessed on a country-by-country basis because taxes are assessed and levied at the national level.
[31] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52016SC0117.
[32] If a group has no EU holding company, each EU subsidiary will be required to publish a CBCR.
[33] Only a qualified majority (16 Member States with a 65% of the EU population) is required for the amendment to be introduced.
[34] Available at: https://ec.europa.eu/taxation_customs/sites/taxation/files/com_2016_683_en.pdf.

consolidate the results of entities in a EU corporate group under a single filing and apportion the aggregate profits to individual Member States according to a formula based on labour, assets and sales. The CCCTB would become mandatory for large MNCs with turnover in excess of €750 million and apply from 1 January 2021. This Directive would automatically offset profits and losses within the group rendering transfer pricing unnecessary for transactions between group entities. Sadiq (2011, 2012) suggests that such formulary apportionment is an optimal way to tax multinational banks because it has greater parity with the location of their economic activity. Other benefits of this approach include greater certainty, improvements in tax compliance from increased simplicity, and a reduction in opportunities for income shifting by reducing the need to determine transfer prices (Sadiq 2011, 2012).

2.2.3 Hypothesis development

On the one hand, public CBCR lifts the veil of opacity regarding firms' tax arrangements which may intensify public scrutiny and negatively impact EU banks in three different ways. First, MNCs may suffer political and reputational costs including consumer boycotts, shareholder backlash, brand erosion, and damaged relationships with governments (Hanlon and Slemrod 2009; Mills et al. 2013; Gallemore et al. 2014; Dyreng et al. 2016; Austin and Wilson 2017). Second, public CBCR may impact the firm's interaction and relationship with tax authorities (Dyreng et al. 2016). Third, EU banks may incur increased proprietary costs through competitors obtaining commercially sensitive information about their country-level tax-related activities. On the other hand, tax avoidance can lead to increases in both accounting earnings and cash flows and new information concerning a firm's commitment to tax minimisation may be rewarded by the capital market (Huesecken et al. 2017; Nesbitt et al. 2017).

Anecdotal evidence highlights managers' concerns about reputational risks. For example, Hanlon and Slemrod (2009) cite General Electric's application of a test to evaluate the reputational risk of tax strategies, where they forgo a strategy if they believe it would be discussed negatively on the *Wall Street Journal's* front page. Dyreng et al. (2016) discuss two recent episodes in the UK involving Starbucks and Amazon. Importantly, each firm responded to the increased public pressure in a

manner consistent with them attempting to limit reputational damage.[35] Davis et al. (2016) provide anecdotes suggesting firms pursue corporate social responsibility (CSR) activities so the public perceives them as 'good corporate citizens' that pay their fair share of tax.[36]

Institutional investors may also be concerned that tax planning strategies make unsustainable contributions to earnings (EY 2015). If a MNC has been exploiting a loophole which is subsequently closed, then ceteris paribus, future earnings may be negatively impacted. In 2016, the EC ordered the Irish government to claw back €13bn in taxes from Apple which raised investor concern (Beesley and Barker 2016). For example, UK fund managers Legal & General Investment Management, the Local Authority Pension Fund Forum, Royal London Asset Management, and Sarasin Partners, wrote a letter to Alphabet raising concerns about its tax arrangements (Ram 2016a).[37] In late 2016, MSCI announced that it will significantly reduce the ESG (Environmental, Social, Governance) ratings of firms embroiled in legal tax disputes, who have low ETRs compared to predicted rates based on revenues, or who have opaque tax structures (Ram 2016c).

Despite concerns about potential reputational damage associated with tax avoidance, empirical evidence of this association is relatively scarce, and results are mixed. Hanlon and Slemrod (2009) find that, on average, a company's stock price declines following public revelation that it engaged in tax sheltering.[38] Lenders may perceive aggressive tax planning as risky and respond via increased debt pricing or the imposition of more restrictive covenants (Hasan et al. 2014). A survey of 600 US corporate tax executives by Graham et al. (2014) finds that reputational concerns rank as the second most important factor explaining why firms do not adopt a particular tax

[35] Both firms received negative publicity concerning the amount of tax they pay in the UK resulting in verbal attacks from members of Parliament, customer boycotts, decreases in reputation ratings, and store closures. Starbucks voluntarily paid future taxes and relocated physical offices to the UK, while Amazon pledged to abandon certain tax-minimising corporate structures.

[36] Interestingly, Davis et al. (2016) find that, on average, socially responsible firms do *not* pay more corporate taxes than other firms and provide evidence that firms who are rated highly for their CSR activities, avoid more taxes which suggests that CSR and taxes act as substitutes. The authors conclude that their results are consistent with anecdotal evidence suggesting that using legal means to reduce taxes is not considered to be a socially undesirable activity.

[37] Similarly, Nordic fund manager Nordea Asset Management wrote to several companies, including Alphabet and Apple, to warn that mounting pressure from regulators and government concerning aggressive tax planning has increased overall risk for investors (Ram 2016b).

[38] Similar results (Choy et al. 2017; Dyreng et al. 2016; Brooks et al. 2016) are discussed in Section 2.6.5.

planning strategy.[39] Recently, Dyreng et al. (2016), find that public scrutiny can impose significant political and reputational costs on large publicly-listed firms. UK firms are required to disclose the name and location of all subsidiaries, regardless of size and materiality.[40] An ActionAid International (AAI)[41] investigation found that half of FTSE 100 firms were non-compliant leading them to petition Companies House to enforce the disclosure rule. After a concerted campaign of public pressure led by AAI, nearly 100% compliance was achieved. Dyreng et al. (2016) find that scrutinised firms decrease tax avoidance (measured using ETRs) and reduce the number of tax haven subsidiaries relative to firms unaffected by public pressure.

In contrast, Gallemore et al. (2014) analyse a sample of 188 firms that were subject to public scrutiny for having engaged in tax shelters during 1995 to 2005. They conduct a multitude of tests examining the reputational effects of tax sheltering on shareholders, managers, auditors, customers, public media and tax authorities, and find no evidence that firms or their top executives face significant reputational costs from tax shelter involvement. Chen et al. (2015) find no evidence that firms reduce their level of tax avoidance following negative media attention. Huesecken et al. (2017) analyse the capital market reaction to the Lux Leaks scandal which was not associated with any penalties or back taxes thus allowing the potential reputational loss to be isolated. The authors find significant *positive* cumulated abnormal returns for involved firms casting doubt on reputational effects. Similarly, Nesbitt et al. (2017) find that, on average, investors reacted positively to news of US firms' inclusion in the Lux Leaks revelations.

Furthermore, shareholders may prefer managers to be 'optimally tax aggressive' to maximise firm value and so tax avoidance may enhance a firm's reputation (Hanlon

[39] The most important factor is the concern that a tax strategy might not pass the judicial standard of 'business purpose/economic substance'. Similarly, EY's *2014 Tax risk and controversy survey* revealed that 89% of the largest MNCs surveyed said they were somewhat or significantly concerned about news media coverage of how much tax they pay or their seemingly low ETR (EY 2014).

[40] Section 409 of the *Companies Act 2006* requires companies to include information on their related undertakings (subsidiaries, joint ventures, associated undertakings and undertakings in which they have a significant influence) in the financial statement footnotes. However, if the directors deem this to be excessively lengthy, Section 410 permits them to limit the disclosures to 'principal subsidiaries' and annex the full list to the annual return filed with Companies House. Section 410 was repealed in 2015 by the *Companies, Partnerships and Groups (Accounts and Reports) Regulations 2015* (SI 2015/980) and from 1 July 2015 UK companies must disclose details of *all* related undertakings in the financial statement footnotes.

[41] ActionAid International is a global non-profit activist group dedicated to ending worldwide poverty.

and Slemrod 2009). Bird and Karolyi (2017) find that positive shocks to institutional ownership lead, on average, to significant decreases in ETRs and greater use of tax haven subsidiaries.[42] Bryant-Kutcher et al. (2012) find that firm value, as measured by Tobin's *q*, is negatively related to foreign ETRs. Gallemore et al. (2014) propose two reasons why some stakeholders react positively to news of tax avoidance thereby minimising any reputational impact to the firm. First, such activity is usually legal and, in most cases, does not amount to fraud, thereby making it more palatable. Second, other risks affecting the firm such as liquidity risk, competition, and going concern may rank much higher than risks associated with tax avoidance. Indeed, financial institutions are subject to regular internal and external assessment of capital adequacy, market liquidity, and value-at-risk, and these issues may supersede any reputational risk associated with tax avoidance.

CBCR may provide new information to tax authorities investigating the tax behaviour of MNCs and trigger increased audit activity and subsequent enforcement actions.[43] Tax-related disclosures can be valuable to tax authorities who must direct scarce enforcement resources to best effect (Mills 1998). Thus, if they utilise the additional information to more efficiently audit firm's tax positions, disclosure of CBCR information may result in tax authorities disallowing certain tax positions and imposing penalties. Prior research on US firms suggests that the IRS finds public disclosures relating to firms' uncertain tax positions (FIN 48 disclosures) useful for tax enforcement (Bozanic et al. 2017). However, tax authorities usually possess substantial powers to request proprietary information about MNCs tax arrangements over and above that provided in tax returns to enable detailed assessment of complex tax positions. Therefore, whether public CBCR provides information incremental to that already provided directly to tax authorities is questionable.

The academic literature examining CBCR is sparse likely because of its recent development. In reviewing CBCR's suitability for combating profit shifting, Fuest et al. (2013) and Evers et al. (2014) argue that financial statements prepared for financial

[42] Bird and Karolyi (2017) implement a regression discontinuity design and examine shocks to institutional ownership around Russell 1000/2000 index reconstitutions. The increase in tax avoidance is largest for firms with poor ex-ante governance and high initial ETRs, suggesting that increases in institutional ownership push listed firms toward a common ETR, and implicate poor governance as an explanation for the under sheltering puzzle (Weisbach 2002).

[43] As tax enforcement actions are usually a lengthy process, any change in ETRs I observe is unlikely the direct result of tax authority action against sample firms (Dyreng et al. 2016).

reporting purposes are not an appropriate platform to provide CBCR, since avoidance strategies are based on the legal exploitation of tax law loopholes.[44] Instead, they argue that legislators should focus on enforcing national and international tax rules and closing gaps in tax law. In contrast, Wojcik (2015) suggests that MNCs may reduce their tax avoidance behaviour in response to CBCR in financial statements because of reduced information asymmetries between MNCs and tax authorities and deterrence effects created by reputational concerns.[45] From a stakeholder theory perspective, Longhorn et al. (2016) contend that CBCR provides information capable of influencing the decision-making process of all the MNC's stakeholders while concurrently ensuring the firm's accountability to them.

Three recent studies document an association between geographical reporting and tax avoidance. First, Hope et al. (2013) find that most US firms voluntarily choose not to disclose their geographic earnings following the adoption of SFAS 131 in 1998 which is associated with significantly lower ETRs.[46] Second, Krapat et al. (2016) find that in the 2007-2012 period, many US MNCs significantly reduced the number of foreign subsidiaries publicly disclosed in their Exhibit 21 in the Form 10-K. They find that tax aggressiveness increases for these firms compared to firms with little or no reduction in the reported number of foreign subsidiaries. Third, Akamah et al. (2018) find that firms operating more extensively in tax havens tend to disclose their foreign operations at a higher level of aggregation in the segment reporting note and conclude that public CBCR would likely highlight tax avoidance.

Finally, EY's *2014 Tax risk and controversy survey*[47] reveals that only 21% of respondents agreed or strongly agreed with the statement: 'We believe that voluntary publishing to the public the amount of taxes we pay where we operate is a prudent step to take'. In contrast, 46% disagreed or strongly disagreed. EY (2014) conclude that many firms believe the need for greater transparency is about constructive taxpayer-to-tax authority dialogue and not something that should be played out on the public

[44] This aligns with the BEPS project recommendation to provide CBCRs directly to tax authorities.
[45] Wojcik (2015) notes this is more likely in response to 'full CBCR' as advocated by Murphy and TJN (2010, 2012) than to 'partial CBCR' adopted by CRD IV.
[46] However, the effects diminished with the introduction of Schedule M-3 in December 2004 which requires MNCs to provide a detailed reconciliation of book-tax differences in their tax return to the IRS including detailed information on each foreign entity (Hope et al. 2013).
[47] Between November 2013 and January 2014 (before the first CBCRs were required), EY surveyed 962 tax and finance executives representing more than 20 industries in 27 jurisdictions.

stage. However, three GSIBs *voluntarily* chose to *publicly* disclose *all* disclosure items for 2013 suggesting that the benefits from providing an enlarged information set outweighed the costs of disclosure.[48] These firms provided an ex-ante signal that the potential detrimental effects of public CBCR are minor.[49]

Moreover, Bushman (2014) emphasizes that while information disclosure is a necessary condition for bank transparency, transparency also relies on the active effort of information recipients driven by their incentives to gather, interpret and impound available information into decision-making.[50] CBCR is reliant upon the ability of information receivers, including critics and news media, to accurately decipher the disclosures.[51] International tax law is complex and interested parties lacking specific tax knowledge may misunderstand, misuse, or misinterpret the information leading to misplaced accusations of corporate tax avoidance (Devereux 2011; Evers et al. 2014).[52] For instance, low (or zero) tax payments do not necessarily mean that a MNC is engaging in tax avoidance or undertaking any form of illegal activity. Rather, it may simply reflect current year tax losses, the recoupment of prior year tax losses against current taxable income, or credits and deductions available to encourage certain expenditure such as research and development.

In summary, whether and by how much EU banks modify their tax aggressiveness in response to increased transparency facilitated by mandatory public CBCR is ex-ante unclear. To examine this question empirically, I use a difference-in-differences research design to measure changes in tax avoidance undertaken by EU banks relative to a control group of comparable firms exempt from CBCR disclosure requirements. The difficulty in finding an appropriate control group is exacerbated by the fact that CBCR requirements apply to *all* banks operating in the EU (Beatty and Liao 2014). Nevertheless, multinational EU insurance firms are selected as the control group for

[48] The three firms are Royal Bank of Scotland, Barclays, and Standard Chartered. Leuz and Wysocki (2016) suggest that examining firms' responses to new regulation is an alternative way of estimating whether a regulatory act has been net costly or beneficial.
[49] Although this may be partially due to the fact these UK domiciled firms have been disclosing details about their subsidiaries since 2006 in accordance with the *Companies Act 2006*.
[50] Bushman (2014) defines bank transparency as the availability to outside stakeholders (depositors, investors, borrowers, counterparties, regulators, policy makers) of relevant, reliable information about the periodic performance, financial position, business model, governance, value and risks of banks.
[51] Leuz and Wysocki (2016) note that the responses of the information receiver are generally the reason the disclosure feeds back to the real actions of the sender.
[52] Murphy (2016) discounts this argument on the basis that public CBCR is merely an extension of corporate financial reporting and thus comprehensible to users.

several reasons. First, they operate in a similar industry providing financial services to retail and business customers. Second, they are headquartered in the EU and therefore subject to the same institutional setting as EU banks. They face the same legal frameworks, political landscape, operating environments, and tax enforcement regimes common to all EU firms. Third, like EU banks, EU insurers are subject to additional (albeit different) regulation and supervision over and above that placed on firms in non-financial services industries.[53] Fourth, multinational insurers operate in more than one country so likely face similar financial reporting incentives as EU banks and will also enjoy tax minimisation opportunities only available to firms operating in multiple jurisdictions. Finally, they are exposed to the same general economic trends as EU banks. This leads to the first hypothesis, stated in null form:

H1: EU banks do not change their level of tax avoidance relative to EU insurers after the introduction of mandatory public CBCR.

CBCR disclosures are only available for EU banks from 2013 precluding the use of a difference-in-differences design. This leads to the second hypothesis:

H2: EU banks do not change their intensity of tax haven use in the years after the introduction of mandatory public CBCR.

2.3 Research design

2.3.1 Measures of tax avoidance

I define tax avoidance as a reduction in cash taxes paid, consistent with the definition offered by Hanlon and Heitzman (2010).[54] Importantly, the main goal of this study is not to quantify the amount of tax avoidance (if any) undertaken by EU banks. Rather, the objective is to examine any *changes* in tax avoidance after the implementation of CBCR. Given tax avoidance is inherently difficult to detect let

[53] EU insurers are impacted by a reform called Solvency II which came into force in January 2016 and stipulates minimum amounts of financial resources that insurers must have to cover the risks they are exposed to. However, the new solvency requirements have no impact on tax transparency.

[54] I focus on measures designed to capture the total amount of taxes avoided rather than on specific tax minimisation strategies because such activities are unobservable to researchers. In their review paper, Hanlon and Heitzman (2010) discuss the difficulty in defining tax avoidance and suggest that the degree of tax aggressiveness is 'in the eye of the beholder'. Furthermore, Hanlon and Heitzman (2010) highlight the importance of selecting tax avoidance measures appropriate to the research question rather than simply employing a battery of different measures.

alone measure, and because each measure has its own limitations (Blouin 2014), I employ two accounting-based proxies.[55] This approach increases the likelihood that I capture the full range of tax avoidance strategies used and increases confidence in the robustness of the measures should the results across the proxies be consistent.

The first proxy the firm's annual cash ETR (*CETR*) calculated as cash taxes paid per the cash flow statement divided by pre-tax income (Chen et al. 2010; Rego and Wilson 2012; Lennox et al. 2013; Bird and Karolyi 2017). Because cash taxes paid is used in the numerator, tax avoidance activities that decrease a firm's cash tax burden will directly impact the firm's cash ETR making it the most direct measure of a firm's cash tax burden.[56] Traditional book ETRs use total income tax expense in the numerator which may be affected by opaque income tax accruals and hence observing a lower book ETR is not sufficient to conclude that a firm lowered its level of tax avoidance after an event of interest took place.[57] Furthermore, book ETRs that use total income tax expense in the numerator only reflect aggressive tax planning through permanent book-tax differences, whereas *CETR* captures both permanent and temporary book-tax differences. Given public scrutiny centres on the payment of cash corporate taxes by MNCs, *CETR* is the most appropriate proxy to use in the analysis.

In addition, I follow recent studies (Gallemore et al. 2014; Brooks et al. 2016) and employ the annual *current* book ETR (*BETR*) as the second proxy. *BETR* is calculated as current income tax expense from the income statement divided by pre-tax income. *BETR* captures tax strategies that give rise to both permanent and temporary book tax differences. Both ETRs are constrained to fall within the [0,1] interval to mitigate the impact of influential negative values of ETR and to allow for meaningful ETR interpretation (Gallemore et al. 2014; Dyreng et al. 2017b).[58] Generally, lower (higher) ETRs suggest higher (lower) levels of tax avoidance.

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[55] Hanlon and Heitzman (2010) stress that accounting-based measures of tax avoidance are not ideal for international studies because differences in tax avoidance proxies can be due to differences in accounting rules. However, all sample firms in this study prepare their financial statements in accordance with IFRS for the entire sample period thereby eliminating such problems.

[56] Bird and Karolyi (2017) contend that shareholders should be more concerned with cash flows rather than the timing of income streams based on generally accepted accounting principles. They find that institutional investors appear to be more concerned with CETRs in contrast to managers and analysts.

[57] Dhaliwal et al. (2004), among others, find that income tax expense can be used as an earnings management device.

[58] In robustness tests, I follow Edwards et al. (2016) and bound *CETR* and *BETR* at [-1,1] since some firms have negative pre-tax income in some years during the sample period (i.e., firms with negative

2.3.2 Measures of tax haven use

In the tests relating to the use of tax havens by EU banks, the dependent variable (*HAVEN*) is designed to capture the extent to which firms use tax havens to reduce their tax burden.[59] Again, the objective is to investigate *changes* in the use of tax havens since the enactment of CBCR. Due to data unavailability, prior studies (e.g., Markle and Shackelford 2012b) rely upon proxies for tax haven intensity based on the disclosure of 'material' subsidiaries in tax havens. This hand-collected data from Exhibit 21 of US firms only includes the name of the subsidiary and its country of location. Unfortunately, this data does not provide financial information to determine the degree of income shifting nor does it delineate between those entities used for operating or financing activities versus those used solely for tax-related reasons. Akamah et al. (2018) emphasise that researchers cannot observe transactions used to shift income to tax havens and must therefore rely upon such proxies.[60]

However, an advantage of CBCR is that it facilitates the development of new, more refined, measures of tax haven activity not previously used in the literature. Recall that EU banks must disclose, among other information, the turnover and profit or loss before tax for *every* country they operate in.[61] Therefore, I use turnover and profit or loss before tax to capture the activity undertaken in and through tax havens. The first (second) measure is *THAV_TO* (*THAV_PBT*) calculated as the ratio of turnover (profit or loss before tax) disclosed in tax havens to total turnover (profit or

pre-tax income in the denominator), and to allow for refunds (i.e., negative cash taxes paid in the numerator). I also drop firm observations with negative pre-tax income.

[59] Appendix B provides a list of the jurisdictions deemed tax havens.

[60] Akamah et al. (2018) argue that reliance on proxies based on the number of tax haven entities is justified on two additional grounds. First, firms unlikely locate operations in tax havens solely for economic reasons since tax havens are typically small jurisdictions with small populations and economic sectors. Thus, the ability to shift income to these low-tax jurisdictions is more likely the primary motive. Second, the media, non-government organisations, and tax authorities focus on the use of tax haven entities in income shifting schemes. Furthermore, Dyreng et al. (2016) outline reasons for multiple tax haven entity use. First, complex tax minimisation strategies such as the 'Double Irish-Dutch Sandwich' may require multiple tax haven entities due to the interaction of corporate tax and withholding tax laws between countries. The 'Double Irish-Dutch Sandwich' uses dual-resident subsidiaries in Ireland ('Double-Irish'), and conduit companies in the Netherlands ('Dutch Sandwich'). Second, subsidiaries may simply be artefacts of acquisitions. Third, holding assets in separate legal entities may reduce risk. Finally, if firms wish to conceal activities from stakeholders then complicated structures involving numerous tax haven entities may be beneficial. Therefore, while imprecise, proxies such as tax haven subsidiary intensity addresses concerns that tax havens offer tax rates so low that MNCs are incentivised to engage in tax avoidance (Dharmapala and Hines 2009).

[61] EU banks must also disclose the name(s), nature of activities and geographical location of all subsidiaries and branches (entities). However, they are not required to disclose financial information for individual entities and therefore information on the relative size of entities is unavailable.

loss before tax). To improve the robustness of the results, I follow prior studies and employ a third measure, (*THAV_ENT*) that captures firms' concentration of entities in tax havens, calculated as the number of entities located in a tax haven scaled by the total number of entities.

Several important issues arise when calculating the tax haven intensity variables. First, some EU banks are headquartered in tax havens (Cyprus, Ireland, Netherlands) making the classification of their home activities problematic. To avoid over-estimating tax haven involvement, I treat the home activities of these firms as non-tax haven activities. Nevertheless, these firms likely have incentives to shift profits *back* into their home country but the degree to which they undertake such profit shifting is unobservable. Second, the results of some tax havens have been aggregated with the results of non-tax havens in the CBCR (e.g., in 2013 HSBC combined the results of the Channel Islands with the UK). Third, CBCR does not require disclosure beyond the country level, so activity in jurisdictions commonly regarded as tax havens (e.g., the State of Delaware in the US, the City of London in the UK) is not separately available. Finally, some firms mask tax haven activity by including the results of these jurisdictions in a 'Other' category in the CBCR. Therefore, the tax haven intensity measures likely understate the extent to which firms recognise activity in tax havens.

2.3.3 Multivariate tests

2.3.3.1 Tax avoidance and the introduction of mandatory CBCR

First, I examine whether EU banks change their level of tax avoidance *after* CBCR is implemented. Based on prior corporate tax avoidance research (Atwood et al. 2012; Davis et al. 2016; Dyreng et al. 2016) the following model is estimated:

$$\begin{aligned} TAX_{i,t} = \quad & \beta_0 + \beta_1 POST_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEV_{i,t} + \beta_5 INTANG_{i,t} + \\ & \beta_6 CAPINT_{i,t} + \beta_7 REVGRTH_{i,t} + \beta_8 \Delta TLCF_{i,t} + \beta_9 TLCF\_DUM_{i,t} + \\ & \beta_{10} TAX\_RATE_{i,t} + \beta_{11} TAX\_ENF_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

The dependent variable (*TAX*) is one of the two tax avoidance proxies (*CETR* and *BETR)* discussed previously. *POST* is an indicator variable for the period after CBCR requirements are implemented (i.e., 2014 onwards).[62] Thus, the coefficient of interest

[62] In robustness tests, I replace *POST* with *POST_2012*.

is β_1, which reflects the average difference in *TAX* between the pre- and post-CBCR periods for EU banks. The remaining coefficients capture the effects of control variables included to help alleviate concerns that correlated omitted variables are confounding inferences. The first group (*SIZE*, *ROA*, *LEV*, *INTANG*, *CAPINT*, *REVGRTH*, Δ*TLCF*, and *TLCF_DUM*) are firm-level characteristics shown in prior literature to be determinants of tax avoidance (Dyreng et al. 2008), whereas the second group (*TAX_RATE* and *TAX_ENF*) are country-level factors affecting international tax planning (Atwood et al. 2012).[63]

Firm size (*SIZE*) controls for general tax planning determinants. Larger firms potentially have higher political costs (Zimmerman 1983) but may have greater tax planning opportunities via economies of scale (Rego 2003) or more sophisticated internal resources (Mills et al. 1998). Some studies document a negative association between profitability (*ROA*) and tax avoidance (Gupta and Newberry 1997; Plesko 2003; Chen et al. 2010), while others find a positive association (Rego 2003; Armstrong et al. 2012). Kim and Li (2014) suggest that more profitable firms can rely on their availability of resources to establish tax haven entities. Firms with more growth opportunities likely face different tax planning incentives than mature firms. The market-to-book ratio is usually used to proxy for growth opportunities but because the sample includes unlisted firms, the change in revenues (*REVGRTH)* is used.

Higher levels of property, plant and equipment typically result in higher tax-deductible depreciation expenses leading to a positive association between capital intensity (*CAPINT*) and tax avoidance (Gupta and Newberry 1997). However, tangible assets (e.g., branch premises, computer systems) may be less important than intangible assets to financial firms. Intangible assets such as intellectual property (e.g., proprietary trading algorithms, costs to acquire and maintain a banking licence), trademarks, and brand names, are relatively mobile and difficult to value due to the absence of well-established markets.[64] *INTANG*, measured as intangible assets scaled by total assets, is used to control for intangible assets but, as noted by Markle and Shackelford (2012b), this measure has drawbacks. Accounting standards generally

[63] All variables are defined in Appendix D.
[64] An OECD report in 2010 on the attribution of profits to permanent establishments suggests that a key intangible in the banking area is proprietary systems for maximising efficient use of regulatory capital and for risk monitoring. Available at: www.oecd.org/ctp/transfer-pricing/45689524.pdf.

mandate that only purchased intangible assets be recognised as assets. Expenditures creating internally generated intangible assets are usually expensed as incurred.

Leveraged firms reduce taxes through the tax-deductibility of interest expenses.[65] Income can be stripped out of high-tax jurisdictions through the strategic relocation of debt leading to thinly capitalised structures (Slemrod and Wilson 2009). Some studies find a positive association between leverage (*LEV*) and tax avoidance (Plesko 2003; Markle and Shackleford 2012b), yet others find a negative association (Chen et al. 2010) possibly due to the debt substitution effect (Graham and Tucker 2006).[66] Firms can usually carry forward tax losses to offset future taxable income and reduce future cash tax payments.[67] I follow Chen et al. (2010) and include the change in a firm's tax loss carry forwards ($\Delta TLCF$), and *TLCF_DUM*, a dummy variable equal to 1 if the firm had a positive TLCF recorded in its financial statements at the beginning of the fiscal year.[68] Ceteris paribus, a decrease in $\Delta TLCF$ implies that firms are utilising TLCFs to lower their current taxable income which reduces the current period ETR. An increase in $\Delta TLCF$ due to the current period's tax loss, will not alter current taxable income since the tax reduction benefits will be carried forward to future periods.

Identification is important in studies analysing the effects of mandatory disclosure. Changes in tax avoidance could be attributed to the newly enacted CBCR rules or other concurrent changes such as changes in enforcement. Therefore, to increase confidence in the results, I follow Atwood et al. (2012) and Li et al. (2016) and include a control for tax enforcement because higher levels of enforcement are expected to restrain tax avoidance activities. *TAX_ENF* is the annual tax evasion scores from the *IMD World Competitiveness Yearbook*.[69] These scores are derived

[65] Interest expenses are generally tax-deductible in EU countries. Full deductibility in some countries is subject to meeting certain requirements such as thin capitalisation and arm's length rules (PwC Worldwide Tax Summaries Online. Available at: http://www.pwc.com/gx/en/services/tax/corporate-tax/worldwide-tax-summaries.html).

[66] Interest costs reduce taxable profits and pre-tax earnings, attenuating the effect of leverage on ETRs.

[67] Tax losses can be carried forward in most EU countries. Restrictions regarding time limits and utilisation apply in some countries. For example, in Greece, tax losses can only be carried forward for 5 years, and in Austria losses can only be offset against taxable income up to a maximum of 75% of the taxable income for any given year (PwC Worldwide Tax Summaries Online. Available at: http://www.pwc.com/gx/en/services/tax/corporate-tax/worldwide-tax-summaries.html).

[68] A small number of missing values of TLCF were replaced with zero as these firms are not expected to have any tax loss carry forwards in the respective period. Including this indicator variable allows me to control for the effect of the presence of TLCFs on ETRs, regardless of any changes in the TLCF.

[69] The *IMD World Competitiveness Yearbook* is a leading annual report on the competitiveness of nations. It benchmarks the performance of 61 countries based on more than 340 criteria measuring

from a survey of over 5,000 business executives from 61 countries report their agreement with the statement 'Tax evasion is not a threat to your economy' on a 1–6 scale (1 indicates strongly disagree and 6 indicates strongly agree). The data are then converted to a 0–10 scale with higher numbers indicating tax enforcement (tax evasion) is perceived to be higher (lower). Using this measure, Li et al. (2016) find a negative association between tax avoidance and enforcement.

The statutory corporate tax rate of the firm's country of domicile (*TAX_RATE*) is included to control for the impact of residence country tax system characteristics (Atwood et al. 2012).[70] The residence country tax system plays an important role because it determines the final layer of tax that the parent pays on all repatriated income prior to the payment of any dividends (Markle and Shackelford 2012a). The expected benefits of engaging in tax avoidance are predicted to increase in the statutory corporate tax rate (Atwood et al. 2012). Although, Markle and Shackleford (2012a) find that the ETRs for MNCs domiciled in high-tax countries are roughly double those in low-tax countries suggesting a negative relation between tax rate and tax avoidance. Nonetheless, a survey of 500 corporate tax executives by Graham et al. (2017) finds that many of them incorporate statutory corporate tax rates into their decision making highlighting the importance of these rates.

Overall, given that prior research finds inconsistent results on the association between tax avoidance and many of the controls, coupled with the lack of research on financial firms' tax avoidance activities, no sign prediction is made on the controls. Finally, I am concerned that standard errors might be understated because asymptotic inference may be unreliable in small samples leading to imprecise standard errors. One remedy is to bootstrap standard errors to adjust for the downward bias (Imbens and Kolesar 2016). Therefore, I follow Dyreng et al. (2016) and use bootstrapped standard errors which are arbitrarily robust to different structures in the data. Bootstrapped standard errors are estimated (with replacement) using 1,000 iterations for each model.

different facets of competitiveness and uses hard statistical data and survey data. Results are not available for Cyprus so the mean score for the remaining countries in the sample is used for this country.

[70] The domicile of a MNC's ultimate parent company is the 'residence country'. A country other than the residence country in which a MNC derives income is a 'source' country.

Next, to test H1, Equation (1) is augmented by including the indicator variable *EU_BANK*, which takes the value of 1 if a sample firm is an EU bank, and 0 if it is an EU insurer. *EU_BANK* is interacted with *POST* to give Equation (2):

$$TAX_{i,t} = \beta_0 + \beta_1 EU\_BANK_{i,t} + \beta_2 EU\_BANK_{i,t} * POST_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (2)$$

In Equation (2), the inclusion of year fixed effects precludes *POST* being included in the model as a stand-alone variable. β_1 reflects the average difference in *TAX* between EU banks and EU insurers in the pre-CBCR period. To test H1, I examine β_2, the coefficient on *EU_BANK*POST* which is the difference-in-differences estimate of the effect of CBCR on tax avoidance in the period after CBCR is implemented. A positive (negative) coefficient on this interaction term indicates an increase (decrease) in *TAX* corresponding to a decrease (increase) in tax avoidance of EU banks relative to EU insurers in the post-period. I initially present the results for two specifications. The first includes year fixed effects to capture general changes in tax planning over time, while the second also includes country fixed effects to control for differences across countries. I then replace the country fixed effects with firm fixed effects to capture differences across firms. This latter model precludes the inclusion of *EU_BANK*, a time-invariant firm variable.

However, unobservable time-invariant firm characteristics not controlled for in the models may still be present. One remedy to deal with this problem is to estimate the models in first differences (Stock and Watson 2012). Employing a changes specification helps to isolate any changes in tax avoidance after CBCR and improves identification by reducing concerns related to correlated omitted variables. Equations (1) and (2) are re-estimated in first differences to give Equations (3) and (4) below:

$$\Delta TAX_{i,t} = \beta_0 + \beta_1 POST_{i,t} + \sum \beta_k \Delta CONTROLS_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$\Delta TAX_{i,t} = \beta_0 + \beta_1 EU\_BANK_{i,t} + \beta_2 EU\_BANK_{i,t} * POST_{i,t} + \sum \beta_k \Delta CONTROLS_{i,t} + \varepsilon_{i,t} \quad (4)$$

2.3.3.2 Tax haven use and the introduction of mandatory CBCR

In this section, I explore changes in tax haven use (if any) by EU banks in the post-CBCR period (H2). Given that 2013 is the first year CBCR data becomes

available and because it is only available for EU banks, a difference-in-differences research design cannot be used. Nonetheless, I employ two empirical specifications to test for any changes in tax haven intensity during 2013-2016. The initial specification relies on the assumption that 2015 and 2016 represent the period after the CBCR requirements were fully implemented. Underlying this assumption is the fact that 2015 is the first year all EU banks in the sample provide full CBCRs that include all disclosure items. In 2013 (2014), 5 (68) EU banks provide full CBCRs. Based on this assumption, the following model is estimated for EU banks:

$$HAVEN_{i,t} = \beta_0 + \beta_1 POST\_2014_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (5)$$

The dependent variable (*HAVEN*) is one of the three tax haven intensity proxies (*THAV_TO*, *THAV_PBT*, *THAV_ENT*) discussed previously. *POST_2014* is a dummy variable that takes the value of 1 if the year is 2015 or 2016, and 0 if the year is 2013 or 2014. Therefore, the coefficient of interest (β_1) captures any change in *HAVEN* in the period 2015-2016 relative to 2013-2014.

The second specification modifies Equation (5) by replacing *POST_2014* with separate year indicators resulting in Equation (6) below:

$$HAVEN_{i,t} = \beta_0 + \beta_1 YEAR\_2014_{i,t} + \beta_2 YEAR\_2015_{i,t} + \beta_3 YEAR\_2016_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (6)$$

In this model, the coefficients of interest are β_1, β_2, and β_3, which will be statistically significant if there is an increase or decrease in *HAVEN* in any given year relative to the base year of 2013.

2.4 Sample selection and descriptive statistics

2.4.1 Sample selection

The full sample consists of 111 firms for the period 2010 to 2016 (777 firm-year observations) corresponding to 72 EU banks affected by CBCR requirements (504 firm-year observations) and 39 EU insurers unaffected by CBCR rules (273 firm-year observations). The population for the main sample comprises all EU banks because the new CBCR disclosure rules apply to *all* EU banks regardless of their size or the number of countries they operate in. Sample selection commences with the European

Banking Authority's List of Institutions for Supervisory Reporting as at January 2016 (198 firms).[71] Due to the extensive hand-collection required, I then impose several filters as outlined in Panel A of Table 2.1. For example, only firms that operate in more than one country are selected as they are more likely impacted by the new CBCR requirements.[72] Furthermore, I only include EU banks for which English language financial statements could be obtained. Panel A of Table 2.2 reveals that the final sample of 72 EU banks have combined total assets of €31,062bn as at 31 December 2016 which represents 93.0% of the €33,410bn in total assets of all EU credit institutions (ECB 2017a).[73]

The selection of control group firms is challenging because the starting number of EU insurers is roughly half that of EU banks and the number of very large insurers is much smaller relative to banks making matching difficult. Nevertheless, these firms are considered the most appropriate control group as discussed in Section 2.2.3. Sample selection begins with the European Insurance and Occupational Pensions Authority (EIPOA) List of Identified Insurance Groups for Supervision as at November 2015 (102 firms). Then, several restrictions are imposed as outlined in Panel B of Table 2.1. For example, to minimise institutional differences between treatment and control groups, I only include insurers who are headquartered in one of the same 14 countries the EU banks emanate from. Furthermore, only multinational insurers are retained to reduce differences in financial reporting incentives and tax planning opportunities between the two groups. Panel A of Table 2.3 reveals that the 39 contol firms have combined total assets of €6,485bn as at 31 December 2016 representing 83.4% of the €7,775bn in total assets of all EU insurers (ECB 2017b).

Data for the empirical models was collected from a variety of sources. For the publicly-listed firms, data for the tax avoidance proxies and firm-level controls was collected from *Datastream,* whereas for the unlisted entities, this data was hand-

[71] Consolidated Banking Data published by the European Central Bank (ECB) as at 31 December 2016 reveals 349 banking groups but does not include a list of the individual firms (ECB 2017a).
[72] For example, Metro Bank and Virgin Money are excluded as they are purely domestic UK firms.
[73] Credit Agricole SA, Natixis, and CIC are included as stand-alone firms in the sample despite being partially owned by Credit Agricole Group (57%), Groupe BPCE (71%) and Credit Mutuel Group (87%), respectively. All three are listed on the Paris stock exchange and accordingly, their corporate structures are different from their unlisted parents plus their managers likely have different incentives. They also publish separate CBCRs. If these three firms are excluded, then total assets of the sample amount to €28,741bn or 86.0% of the total assets of all EU banks as at 31 December 2016. Inferences made from the results of the primary empirical tests remain unchanged if these firms are excluded.

collected from annual reports. CBCR disclosure items (turnover, profit before tax, etc.) were hand-collected from the annual CBCR of each EU bank.[74] However, some banks do not disclose their list of entities in the CBCR but refer to such a list in the financial statement notes. In these cases, data was hand-collected from the relevant notes to the financial statements.[75] Information on carried forward tax losses was hand-collected from the financial statement footnotes for all sample firms as this data item is not available on *Datastream*. To calculate the tax enforcement variable, the annual tax evasion scores were hand-collected from the *IMD World Competitiveness Yearbook*, and the statutory corporate tax rates were hand-collected from online sources (OECD Tax Database, PwC's worldwide tax summaries, and KPMG's corporate tax rates table). Finally, the consolidated financial statements of all sample firms are prepared in accordance with IFRS standards and are audited by Big 4 accounting firms, removing any differences in the basis of preparation and presentation of their financial statements. Finally, the relatively small sample size means that the empirical tests could easily be influenced by a small number of influential observations. To mitigate this risk, all continuous variables are winsorized at the 1st and 99th percentiles. All variables are defined in Appendix D.

Panel A of Table 2.2 lists the EU banks, their country of residence, GSIB and listing status, and total assets measured in Euros as at 31 December 2016. The table reveals considerable variation in the size of the EU banks. HSBC is the largest with €2,257,345m in total assets while BKS Bank is the smallest with only €7,581m in total assets. Panel B shows the sample composition by country with 14 countries covered although a greater proportion comes from the major European countries France,

[74] Given that the first CBCRs were published for the 2013 fiscal year, this data is only available for 2013-2016 thus reducing the sample for tests involving tax havens.

[75] In the UK, Section 409 of the *Companies Act 2006* only requires UK-listed firms to provide a full list of subsidiaries for the 2015 financial year onwards. In prior years, if the firm did not voluntarily disclose this list in their annual report they were obliged to submit the list as an annexure to the annual return lodged with Companies House. HSBC, Lloyds Banking Group, and Barclays exercised this option so the full lists of subsidiary undertakings were obtained directly from Companies House. Similarly, local regulations in Denmark, Ireland, and the Netherlands permit Danish, Irish and Dutch firms to only disclose *principal* undertakings in their annual reports and include the full list of subsidiary undertakings with its annual return to the Danish Business Authority (DBA), Companies Registration Office (CRO), and the Netherlands Business Register (NBR), respectively. Online inquiries revealed that the DBA and NBR only have current listings of subsidiaries. However, I managed to obtain a full list of subsidiaries directly from Danske Bank. The full list of subsidiaries for Allied Irish Banks was obtained from the CRO but not for the Bank of Ireland. The Investor Relations Department of the Bank of Ireland advised that the company is an unregistered company and hence the CRO does not have filed documents available on the online platform. However, the documents filed for this company are available in person at the company's registered office in Dublin.

Germany, and the UK. Panel C reveals the asset size by firm-type. The mean (median) total assets of the entire sample is €431,510m (€210,189m) split between GSIBs with €1,258,985m (€1,287,183m) and non-GSIBs with €231,775m (€150,552m). This highlights the industry domination by a relatively small number of very large firms.

Details on the composition of the control sample are presented in Table 2.2. Similar to EU banks, Panel A reveals that the top 10 insurers by asset size collectively account for approximately 79% of total assets. As shown in Panel B, the insurers are headquartered in 9 of the 14 EU countries the banks are from with firms from France, Germany and the UK dominating the sample. Panel C shows that the mean (median) total assets of the EU insurers is €166,279 (€63,612).

2.4.2 Descriptive statistics

The annual mean and median of *CETR* and *BETR* for EU banks and EU insurers is plotted across the sample period in Figures 2.1 and 2.2. Both panels in Figure 1.1 illustrate that despite differences in levels, the pre-CBCR trend in *CETR* is broadly similar for both groups of EU firms. However, after the introduction of CBCR in 2013, the *CETR* for EU insurers begins a more upward trend relative to EU banks and the difference in levels increases. A similar pattern is presented in both panels of Figure 2.2 for the *BETR* although the difference in levels is less stark in the pre-CBCR period. However, similar to the results in Figure 2.1, after the introduction of CBCR in 2013, the *BETR* for EU insurers continues an upward trend whereas the *BETR* for EU banks commences a downward trend. Overall, the similar pre-CBCR trends in *CETR* and *BETR* provides comfort that the parallel trends assumption underlying the difference-in-differences methodology is satisfied (Roberts and Whited 2013).[76]

Table 2.4 reports the summary statistics. The mean of *CETR* (*BETR*) for all firms is 22.8% (24.2%), which is substantially lower than the mean statutory corporate tax rate of 27.8%, but similar to differences found in prior research on US firms (Dyreng

[76] Nevertheless, to formally examine whether the parallel trends assumption is reasonable, I estimate Equation (2) but replace the interaction variable *EU_BANK*POST* with separate interactions between *EU_BANK* and each year indicator for the years 2011 to 2016. In untabulated results, the estimated coefficients on the interaction between *EU_BANK* and the separate indicators for the years in the pre-CBCR period (i.e., *YR2011*, *YR2012*, and *YR2013*) are insignificant when both *CETR* and *BETR* are the dependent variable. These results suggest that the treatment and control groups exhibit parallel trends in the outcome variable (*TAX*) in the period prior to treatment (*CBCR*).

et al. 2008).[77] EU banks have significantly lower ETRs than EU insurers. The mean *CETR* (*BETR*) for EU banks is 20.2% (22.2%) compared to 27.5% (27.8%) for EU insurers. The means of the tax haven intensity proxies *THAV_TO*, *THAV_PBT*, and *THAV_ENT*, are 5.1%. 7.3%, and 17.5% respectively. The latter is similar to prior research on UK firms (Dyreng et al. 2016) and US firms (Krapat et al. 2016).[78] This suggests that EU banks have a non-trivial proportion of turnover, pre-tax profits, and entities (subsidiaries and branches) located in tax havens. The results in Table 2.4 also reveal that EU banks are significantly larger, less profitable, use more leverage, have less intangible and tangible assets, and have lower revenue growth relative to EU insurers. Most firms (83.7%) have carried-forward tax losses (*TLCF_DUM*) which can be used to offset future tax liabilities. The mean value of the tax enforcement proxy for (*TAX_ENF*) is 4.496 on a scale of 1 to 10, with larger values representing greater tax enforcement (less tax evasion).[79]

Table 2.5 presents the Pearson (below diagonal) and Spearman (above diagonal) correlations with significant (p-value < 0.05) coefficients reported in bold. In Panel A, *CETR* and *BETR* are significantly positively correlated suggesting each captures the same underlying construct. Likewise, in Panel B, all three tax haven intensity proxies are significantly positively correlated. Interestingly, in both panels, none of the correlations between the tax avoidance or tax haven intensity proxies and *POST* are significant. Collinearity between the controls is generally low to moderate with the highest correlation coefficient being -0.671 (p-value < 0.05) between *INTANG* and *LEV*. Tests of collinearity are conducted (untabulated) by regressing the primary dependent variables *CETR* and *BETR* on all independent variables and calculating the variance inflation factors (VIFs) for each variable. The mean VIF is 1.6 and the highest VIF across both regressions is 3.0, well below the generally accepted threshold of 10. This provides comfort that multicollinearity is a not a problem in the models.

Table 2.6 summarises the location of key CBCR disclosure items. Panel A reveals that, on average, firms have over 224 entities (Column 5) located in approximately 20

[77] I do not attempt to interpret the magnitude of any difference in computed ETRs compared to statutory corporate tax rates but rather focus on the relative change in ETRs to determine the extent of any change in the level of tax avoidance.
[78] *THAV_TO* and *THAV_PBT* are new variables thus no comparisons can be made to prior research.
[79] This measure varies widely among countries and across time. Over the sample period, Greece has the lowest average score of 1.37 compared to the highest of 6.29 for The Netherlands. In 2010, the score averaged 3.28 relative to the high of 5.01 in 2012 and 2013 (4.74 in 2016).

countries (Column 2). The reduction of 22.3% (Column 9) in the mean number of tax haven entities between 2013 and 2016, is greater than the decrease of 14.1% in the mean number of total entities (Column 6), resulting in a decrease in the percentage of entities in tax havens from 18.4% in 2013 to 16.7% in 2016 (Column 10).[80] Panel B shows that, on average, tax havens accounted for 7.8% of turnover, 18.5% of profit before tax, and 4.5% of employees over the period 2013-2016. Prima facie, the proportion of key CBCR disclosure items located in tax havens is relatively stable over time with the exception of profit before tax which only had to be disclosed from 2014.

2.5 Results

2.5.1 Univariate tests

Table 2.7 reports the results of univariate tests of tax avoidance pre- and post-CBCR implementation.[81] The post period is defined as 2014-2016 being the years *after* the CBCR requirement came into effect. Panel A reports the results for the full sample while Panels B and C (Panels D and E) report the results for EU banks and EU insurers (listed and unlisted EU banks). The results in Panel A are statistically insignificant. However, in Panel B, *CETR* decreases by 0.026 (*p*-value = 0.208) while *BETR* decreases by 0.049 (*p*-value = 0.016). This suggests that, on average, EU banks *increase* their level of tax avoidance (measured using *BETR*) in the period after the new rules came into effect. In Panel C, the mean values of *CETR* and *BETR* increase but are insignificant. The results in Panels B and C align with the trends documented in Figures 2.1 and 2.2. The results in Panels D and E indicate that the decrease in *CETR* and *BETR* for EU banks is driven primarily by unlisted EU banks.

2.5.2 Multivariate tests

2.5.2.1 Tax avoidance and the introduction of mandatory CBCR

Table 2.8 reports the results of estimating Equation (1) for EU banks when the dependent variable is *CETR* (Models 1 and 2) and *BETR* (Models 3 and 4) with Models

[80] The number of entities located in a tax haven varies dramatically from over 300 for Deutsche Bank to 0 for some firms (e.g., CaixaBank, Oberbank, BKS Bank and Nykredit Realkredit).
[81] Univariate test of the difference in means of *THAV_TO*, *THAV_PBT*, and *THAV_ENT* before and after CBCR implementation cannot be conducted because this data only becomes available from 2013.

(2) and (4) including country fixed effects to control for differences across countries. In all models, the estimated coefficient on *POST* is significantly negative and ranges from -0.039 (*p*-value = 0.089) in Model (2) to -0.050 (*p*-value = 0.019) in Model (4).[82] Interestingly, this suggests that, on average, EU banks *increase* tax avoidance after 2013, consistent with the benefits of tax avoidance outweighing the potential costs and possibly some learning effect (discussed in Section 2.6.1). The economic magnitude of these results is substantial. During the sample period, EU banks had an average *CETR* (*BETR*) of 0.202 (0.222). Using mean pre-tax income of €2,779m for the post-CBCR period, the results represent a reduction of around €21.9m in cash taxes paid or €30.8m in current income tax expense.[83]

Despite the preceding results, the difference-in-differences design is employed to empirically test H1. The results of estimating Equation (2) are presented in Table 2.9 and the variable of interest is *EU_BANK*POST*. In Models (1) and (2) where *CETR* is the tax avoidance proxy, the estimated coefficient on *EU_BANK*POST* is negative but statistically insignificant. For example, in Model (1), the coefficient is -0.048 (*p*-value = 0.145). However, in Models (3) and (4) that use *BETR* as the dependent variable, the negative coefficient on *EU_BANK*POST* is -0.074 (*p*-value = 0.026) and -0.062 (*p*-value = 0.056), respectively. These results suggest that EU banks *increase* tax avoidance after CBCR relative to EU insurers despite being subject to increased transparency through CBCR disclosures. Prima facie, this leads to the rejection of H1 but only when tax avoidance is measured using *BETR*.[84]

As a robustness test, I adopt a more conservative approach and replace the country fixed effects with firm fixed effects to capture differences across firms and re-estimate Equations (1) and (2). Table 2.10 presents the results. In Panel A, the coefficient on *POST* is negative but insignificant at conventional levels in both models. The estimated coefficient on *EU_BANK*POST* in Panel B is also negative but insignificant in both models. The results of estimating Equations (3) and (4) are presented in Table 2.11 when Δ*CETR* and Δ*BETR* is the dependent variable.[85] In both panels, the estimated coefficient on the variable of interest is not statistically significant. The

[82] In Models (2) and (4) the country-level variables (*TAX_RATE* and *TAX_ENF*) are subsumed by the country fixed effects.
[83] For Model (2) €2,779m x (0.202 x -0.039) and for Model (4) €2,779m x (0.222 x -0.050).
[84] Results are similar if I include *POST* as a stand-alone variable and exclude the year fixed effects.
[85] Two observations are lost as 2010 is the first year that data was available for one bank and one insurer.

results in Tables 2.10 and 2.11 suggest that there may be unobservable time-invariant firm characteristics not included in the set of controls, such as firm governance structures, that explain the results in Tables 2.8 and 2.9.

Overall, the results are mixed, but I do find some evidence that supports the rejection of the null hypothesis (H1). Specifically, on average, EU banks *increase* tax avoidance *after* mandatory public CBCR comes into force, relative to EU insurers exempt from CBCR. However, the results only apply when *BETR* is the tax avoidance proxy and differences across time and countries are controlled for.

2.5.2.2 Tax haven use and the introduction of mandatory CBCR

Table 2.12 reports the results of estimating Equation (5) for EU banks for 2013-2016. Panel A (Panel B) reports the results for all EU banks (EU banks that use tax havens i.e., when *THAV_TO*, *THAV_PBT*, or *THAV_PBT* $\neq 0$). In all models of both panels, the estimated coefficient on *POST_2014* is statistically insignificant. The results of estimating Equation (6) for EU banks from 2013-2016 are presented in Table 2.13. None of the estimated coefficients on any of the year dummies is significant. The results in Tables 2.12 and 2.13 are consistent with the year-by-year summary provided in Table 2.6. Therefore, I find no evidence for the rejection of H2.

2.5.3 Discussion of results

Overall, from the results of the tax avoidance tests and tax haven intensity tests, it is evident that EU banks do not *decrease* tax avoidance in response to public CBCR as the results of prior studies may suggest (e.g., Dyreng et al. 2016). Rather, the results are consistent with the expected benefits of tax avoidance continuing to outweigh the potential costs in the more transparent post-CBCR period. These results are similar to those of recent studies documenting little, if any, reputational costs associated with the public disclosure of tax avoidance (Gallemore et al. 2014; Huesecken et al. 2017; Nesbitt et al. 2017). Alternatively, EU banks may be fully compliant with existing tax laws or are confident that their current tax strategies would withstand tax authority scrutiny. Hence, any pressure to alter their existing tax arrangements emanating from the increased transparency offered by public CBCR may be unwarranted.

2.6 Additional analysis

2.6.1 Cross-sectional variation in the results of EU banks

In this section, I investigate whether the effect of public CBCR on tax avoidance undertaken by EU banks documented in Table 2.8 varies in line with public listing status. Specifically, the sample of EU banks comprises 48 listed and 24 unlisted firms many of whom are large (e.g., Credit Agricole, Rabobank) and more likely impacted by CBCR. Listed firms face capital market pressures regarding financial performance potentially driving them to undertake tax avoidance. Graham et al.'s (2014) survey confirms that increasing reported earnings is an important outcome of tax planning for public firms.[86] In contrast, unlisted firms have relatively weaker incentives to focus on reported earnings and are more likely driven by tax and other considerations (Beatty and Harris 1999; Ball and Shivakumar 2005). However, financial analyst coverage is likely to increase public awareness of the underlying practices of listed firms including aggressive tax strategies, which may attract unwanted public scrutiny (Allen et al. 2016).[87] Jaafar and Thornton (2015) examine European firms over the period 2001-2008 and find that the negative association between tax haven operations and ETRs is more pronounced for private firms than for public firms.

To account for potential differences in financial reporting incentives, I partition the EU banks into 2 groups according to listing status and re-estimate Equation (1). Table 2.14 reports the results. In Panel A (*CETR*), all estimated coefficients on *POST* for listed banks are negative but insignificant. In contrast, the coefficient on *POST* for unlisted banks is significantly negative at -0.079 (*p*-value = 0.028) when country or firm fixed effects are excluded from the model, and -0.058 (*p*-value = 0.124) when country fixed effects are included. The coefficient becomes statistically insignificant with the inclusion of firm fixed effects. In Panel B (*BETR*), all negative coefficients on *POST* for listed EU banks are insignificant whereas all three coefficients are significantly negative for unlisted EU banks. For example, the coefficient is -0.068

[86] Although, Burgstahler et al. (2006) find that EU private firms exhibit higher levels of earnings management than listed firms, contrary to the belief that capital markets exacerbate incentives to manage earnings. The authors contend that because private firms are less reliant on earnings to communicate firm performance, making earnings less informative in the process of minimising taxes is less of a concern to these firms.

[87] Allen et al. (2016) find a negative relation between analyst coverage and tax aggressiveness, suggesting that that higher analyst coverage constrains corporate tax aggressiveness.

(*p*-value = 0.032) when country fixed effects are included and -0.076 (*p*-value = 0.077) when firm fixed effects are included. The magnitude of the negative coefficients on *POST* for unlisted firms is greater than listed firms in all models.

The results suggest that unlisted banks increase tax avoidance *more* in the post-CBCR period relative to their listed counterparts. The univariate results in Panels D and E of Table 2.7 reveal that in the pre-CBCR period, the mean *CETR* (*BETR*) of unlisted banks was 0.255 (0.253) compared to 0.192 (0.238) for listed banks. Furthermore, the significant decrease in unlisted firms' ETRs in the post-CBCR period, results in both ETRs reducing to a level similar to listed banks. Therefore, a possible explanation for the findings in Table 2.14 is that unlisted banks learn about their publicly-listed competitors' tax avoidance activity through enhanced visibility via CBCR. They may then mimic their listed peers' behaviour to achieve a reduced tax liability that is more in line with the industry average.

I also re-estimate Equations (5) and (6) for the two groups of EU banks (results untabulated). First, I find no statistically significant coefficients on *POST_2014* corresponding to Table 2.12. However, for listed EU banks, the estimated coefficient on *YEAR_2016* when *THAV_ENT* is the dependent variable is -0.024 (*p*-value = 0.095) and -0.027 (*p*-value = 0.072) corresponding to Models (5) and (6) in Table 2.13. This suggests that the 24.4% decrease in the mean number of tax haven entities from 39.3 in 2015 to 34.2 in 2016 (documented in Panel A of Table 2.6) is driven primarily by listed firms. These firms may be responding to increased public scrutiny specifically related to subsidiary location similar to the ActionAid International campaign in the UK documented by Dyreng et al. (2016). The removal of unwanted or unused entities is a relatively easy and low-cost option to decrease perceived tax haven exposure.

2.6.2 Quantile regression

Recent studies (Brooks et al. 2016; Bird and Karolyi 2017; and Huesecken et al. 2017) differentiate results between low- and high-ETR firms because any change in ETR may depend on the initial level of tax avoidance. Hence, I suspect that the impact of CBCR on tax avoidance may differ at relatively low and high levels of tax avoidance. Therefore, following Armstrong et al. (2015), the scope of the analysis is expanded by estimating Equations (1) and (2) not only at the conditional mean, but

across the entire tax avoidance distribution. Quantile regression has the advantage of describing the relation between the independent variables and any specified quantile of the conditional distribution of the dependent variable (Hao and Naiman 2007).

The results (untabulated), show that the coefficient on *POST* corresponding to Table 2.8 is significantly negative only in the higher quintiles. Specifically, regarding Equation (1), when *CETR* is the dependent variable, the coefficient on *POST* is -0.033 (*p*-value = 0.103) at the 60th percentile and -0.057 (*p*-value = 0.109) at the 80th percentile. Similarly, when *BETR* is the dependent variable, the coefficient on *POST* is -0.036 (*p*-value = 0.052) at the 60th percentile and -0.063 (*p*-value = 0.081) at the 80th percentile. In both cases, the coefficient on *POST* at the 20th and 40th percentiles is statistically insignificant. In relation to Equation (2), when *CETR* is the dependent variable, the coefficient on *EU_BANK*POST* is significantly negative only at the 60th percentile (coefficient = -0.057 and *p*-value = 0.092). Similarly, when *BETR* is the dependent variable, the coefficient on *EU_BANK*POST* is -0.089 (*p*-value = 0.072) at the 80th percentile only. These results suggest that only EU banks with higher ETRs (lower tax avoidance) reduce their ETRs after CBCR comes into effect. However, the results must be interpreted with caution as the tests may be simply reflecting mean reversion in ETRs over the sample period.

2.6.3 Disconnect between the location of profits and real operations

Global value chains adopted by many MNCs may create a disconnect between the location of real operations and the jurisdiction in which profits generated by those operations are declared. This has led to allegations that MNCs shift profits away from the jurisdictions where the activities creating those profits take place to low or no tax jurisdictions. One purported benefit of CBCR is that more granular data permits a deeper analysis of the firm's financial involvement with tax havens versus their economic presence in such jurisdictions (Murphy 2016). At first glance, the results in Table 2.6 imply a level of incongruence between profits recognised in tax havens (18.5% of total profits) and 'real' presence in tax havens (7.8% of total turnover and 4.5% of total employees) similar to the results documented by Aubry and Dauphin (2017). The authors examine the extent to which the 20 largest EU banks use tax havens based only on the 2015 CBCRs of these firms. They find that tax havens account for 26% of total profits despite only accounting for 12% of turnover and 7%

of employees, signalling a discrepancy between the profits recorded in tax havens and the underlying level of real economic activity.

I exploit the availability of new CBCR data from 2013 and test for any disconnect between the location of profits and 'real' activities in tax havens. The proportion of tax haven turnover and employees are used as proxies for real activities, consistent with proposed formulary apportionment of group-wide profits (see Footnote 16). Thus, the following specification is estimated using OLS:

$$THAV\_PBT_{i,t} = \beta_0 + \beta_1 THAV\_TO_{i,t} + \beta_2 THAV\_EMP_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (7)$$

Panel A of Table 2.15 reports the results. Models (1) and (3) present the results for all EU banks while the results conditional on tax haven use are shown in Models (2) and (4). The positive coefficient on *THAV_TO* in Models (1) and (2) is highly significant indicating that, on average, turnover recognised in tax havens is a key determinant of pre-tax profits located in those jurisdictions. However, the positive coefficient on $\Delta THAV\_TO$ in Models (3) and (4) is not significant. The coefficient on *THAV_EMP* and $\Delta THAV\_EMP$ is statistically insignificant in all models implying a disconnect between tax haven profits and employee numbers. Overall, in the absence of data on the location of assets per country, these results cast some doubt on the notion of a mismatch between the location of profits and operational presence in tax havens. Arguably though, the number of employees better reflects physical presence in tax havens because any relationship between turnover and profit may be mechanical.

2.6.4 Changes to entity locations

The overall 22.3% decrease in the mean number of tax haven entities between 2013 and 2016 (from 44.1 to 34.2) in Panel A of Table 2.6, prompts the question of what is driving this reduction. To investigate this, I follow Dyreng et al. (2016) and estimate the following model:

$$NUM\_TH\_ENTS_{i,t} = \beta_0 + \beta_1 NUM\_ENTS_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (8)$$

where *NUM_TH_ENTS* is the number of tax haven entities and *NUM_ENTS* is the total number of entities in the same period. Panel B of Table 2.15 reports the results when estimating Equation (8). Models (1) and (3) (Models (2) and (4)) report the

unconditional (conditional) results. In all models, the coefficient on *NUM_ENTS* and Δ*NUM_ENTS* is significantly positive, consistent with EU banks eliminating tax haven entities in line with real changes to their corporate structure.

2.6.5 Returns analysis around the implementation of CBCR

In this section, the capital market reaction to public CBCR is analysed. Prior studies examining market reactions to increased public scrutiny of tax avoidance generally find that firms subject to widespread public attention suffer negative market returns (e.g., Hanlon and Slemrod 2009). Choy et al. (2017) document significant negative returns for FTSE 100 firms on 11 October 2011 coinciding with the release of a AAI report titled 'Addicted to Tax Havens'.[88] The report generated significant media coverage and parliamentary action, and the authors' findings are consistent with market participants anticipating negative consequences from the unwanted publicity. Dyreng et al. (2016) extend the analysis and show that the negative returns are concentrated in firms that did not disclose their full subsidiary list initially. Johannesen and Larsen (2016) find that the adoption of CBCR rules for EU extractive firms is associated with significant decreases in firm value, suggesting that financial transparency is a potentially powerful tool to curb tax avoidance. Similar to the results in Gallemore et al. (2014) based on US firms, Brooks et al. (2016) find that UK firms reported in the news regarding allegations of tax avoidance experience small negative stock returns, but these partially reverse within one month. In contrast, Huesecken et al. (2017) and Nesbitt et al. (2017) examine the capital market reaction to news of tax avoidance emanating from the Lux Leaks scandal and find significant positive cumulated abnormal returns (CARs) for the firms involved.

The EC commenced work on CRD IV in 2009 to implement Basel III into EU law with legislation finalised in 2013. In the intervening period, Basel III was agreed by the Basel Committee on Banking Supervision during 2010-11. However, it was not until February 2013 that the EU parliament proposed the inclusion of CBCR in CRD IV. This proposal came late in the legislative process and took many by surprise.[89] Appendix C lists the key events that occurred around the adoption of the CRD IV

[88] The report revealed the name and location of all subsidiaries of FTSE 100 firms, around half of whom were not disclosing such information despite being required to by the UK's *Companies Act of 2006*.
[89] Neither the EC's 2011 proposal for CRD IV, nor any public consultations or public hearings conducted between 2009 and 2013, contain any references to CBCR (Wojcik 2015).

package. To test for a negative market reaction, the daily market-adjusted stock returns and the cumulative market-adjusted stock returns are calculated for the two key events.[90] I use the market-adjusted model (MacKinlay 1997) based on a value-weighted index (with dividends) as used in prior studies investigating market responses to tax avoidance (Hanlon and Slemrod 2009; Gallemore et al. 2014).[91] The final sample comprises 49 publicly-listed EU banks.[92]

Market-adjusted daily stock returns are calculated as follows:

$$AR_{i,t} = \sum_{k=1}^{n} RETURN_{i,j,t} - MARKET\,RETURN_{j,t} \quad (9)$$

where AR is the daily market-adjusted return for firm *i* at time *t*, *k* is event k, *n* is the number of events identified in Appendix C, and *j* is the country of primary listing of the firm. Return and market return are defined in Appendix D. To measure the market return I use the leading index of firm *i*'s country to control for home market shocks that may impact daily returns around the event dates in addition to a broader European equity index (STOXX Europe 600).[93] Cumulative market-adjusted returns over the event period (*p*, *q*) are calculated as:

$$CAR_{i,t\,(p,\,q)} = \sum_{t=p}^{q} AR_{i,t} \quad (10)$$

For the two events, the event window is the 4-day period from day -1 through +3.

Panel A of Table 2.14 tabulates the significance of the abnormal daily returns around the event date ($t = 0$). For Event 1, I find no significant market reaction on the

[90] The EP and EC reached an agreement for the inclusion of two reforms in CRD IV late on 27 February 2013 however these were publicly announced in the media on 28 February 2013 (Event 1). The two reforms were public CBCR and a cap on bonuses for bank executives. On 27 June 2013, the Directive 2013/36/EU was published in the Official Journal of the European Union (OJEU) (Event 2).

[91] No dividends were paid by any of the sample firms during the two event windows.

[92] Of the 72 EU banks in the sample, 48 are publicly-listed enabling stock returns to be calculated. However, some amendments are made to the sample. First, ABN Amro was not publicly-listed in 2013 so is dropped. However, two additional firms are included (ING Group and KBC Group). ING Bank and KBC Bank are not publicly-listed in their own right but their total assets constitute approximately 99% and 87% of the total assets of their publicly-listed parents, ING Group and KBC Group, respectively, as at 31 December 2016. Any market reaction to news of new mandatory disclosures required of their primary subsidiaries is likely reflected in their stock returns. In sensitivity tests, these observations are excluded and inferences remain unchanged.

[93] Indices used are: ATX (Austria), BEL 20 (Belgium), ATHEX Composite (Cyprus), OMX Copenhagen 20 (Denmark), CAC 40 (France), DAX 30 (Germany), FTSE ATHEX Large Cap (Greece), ISEQ Overall (Ireland), FTSE MIB (Italy), AEX (Netherlands), PSI 20 (Portugal), IBEX 35 (Spain), OMX Stockholm 30 (Sweden), and FTSE 100 (UK). STOXX Europe 600 comprises small, mid, and large firms across 17 European countries.

day the agreement to include CBCR in CRD IV is announced but significant negative reactions on days 1 through 3 with mean abnormal returns ranging from of -0.50% to -1.04%. I find a negative and significant market reaction on the announcement date for Event 2, with a mean abnormal return of approximately -1.47%. Negative abnormal returns persist for days +1 through to +3 however none are statistically significant. Panel B reports the CARs across different windows before and after the announcement date (t = 0). For Event 1 (Event 2), statistically significant negative abnormal CARs exist in the majority (all) of the event windows.

Panels C and D report the results if the two related events are combined to jointly capture the effect of CBCR adoption (Schipper et al. 1987). In Panel C, significant negative returns are found for day 0, mildly significant negative returns are found for day 1 (p-values = 10.03), and negative returns are found for day 2 significant at the 1% level. Panel D reports significant negative abnormal CARs in all event windows.

The impact of confounding contemporaneous news is a concern. CBCR only constitutes part of a reform package (bonus cap in Event 1 and the broader CRD IV package in Event 2) and therefore disentangling the overall market response into individual components of the reform package is problematic. Accordingly, I attempt to isolate the market reaction to CBCR by finding media articles specifically discussing EU banks and CBCR and analysing the market reaction thereto. A broad online search of all sources in the FACTIVA database is undertaken using the search terms 'country by country reporting', 'CBCR' and 'banks'.[94] I only find five articles pertaining to the twenty largest EU banks (27 March 2017), the five largest French banks (16 March 2016), Deutsche Bank (22 December 2015), and Barclays (3 March 2015 and 30 June 2014). In the first (second) article, four (two) of the banks discussed are unlisted reducing the sample to 22 observations.

I calculate the ARs for the day -1 to +2 window and in each case, I find statistically significant negative ARs on the day of publication (t = 0), with an AR of -0.39% (-0.40%) when using the local (EU) index (Panel A of Table 2.15). However, these fully reverse on day +1 where I find significantly positive ARs of 0.75% (0.78%) respectively. Panel B reports the CARs across several event windows including the

[94] FACTIVA is a database of global news and information on business provided by Dow Jones & Company.

date of publication ($t = 0$). Across all windows, the CARs are mixed and statistically insignificant. Overall, these results are consistent with equity market participants anticipating negative consequences for EU banks due to higher costs of transparency and scrutiny, however these abnormal negative returns are short-lived consistent with Brooks et al. (2016) and Gallemore et al. (2014).

2.7 Robustness tests

In this section, the results of several robustness checks conducted to assess the sensitivity of the findings in the main analyses are reported.

2.7.1 Alternative proxies of tax avoidance

Hanlon and Heitzman (2010) note that most tax avoidance proxies only capture non-conforming tax avoidance, that is, tax strategies that reduce actual income tax liabilities but not book income (e.g., accelerated depreciation for tax purposes). The extant literature lacks a measure which captures activities that reduce *both* book and taxable incomes (conforming tax avoidance). Furthermore, using pre-tax income in the ETR denominator can be problematic for firms with negative pre-tax income or pre-tax income near zero (Edwards et al. 2016). Abnormally large changes in the ETR may not reflect significant changes in the numerator but could be the result of a small or negative denominator. Therefore, I follow Edwards et al. (2016) and Badertscher et al. (2017) and employ *TAX_AVOID*, a measure that captures 'total tax avoidance', that is, both conforming and non-confirming tax avoidance, calculated as the ratio of cash taxes paid to lagged total assets.[95] In untabulated results, all coefficients on the variables of interest are insignificant when re-estimating Equations (1) - (4).

Next, I follow Edwards et al. (2016) and re-estimate Equations (1) - (4) using ETRs constrained to the [-1,1] interval to better allow for loss firms (observations with negative pre-tax income) and cash refunds (negative cash taxes paid).[96] The results (untabulated) show that the negative coefficients on the variables of interest are of

[95] *TAX_AVOID* has several advantages. First, like *CETR*, the numerator reflects actual tax payments and excludes potentially distortionary income tax accruals. Second, the denominator is a lagged balance sheet measure that is insensitive to current period transactions that may have been manipulated (e.g., earnings management) and to the fact that ETRs can be distorted by negative or low pre-tax income. Similar to *CETR* and *BETR*, this ratio is decreasing in tax avoidance.

[96] In the full sample, 129 observations have negative pre-tax income, 70 have negative cash taxes paid, and 70 have negative current income tax expense.

similar magnitude as those reported in Tables 2.8 – 2.11 but statistical significance reduces. For example, the coefficient on *POST* corresponding to Model (4) in Table 2.8 is -0.062 (*p*-value = 0.052) and the coefficient on *EU_BANK*POST* equivalent to Model (4) in Table 2.9 is -0.069 (*p*-value = 0.127). Finally, to ensure the results are not driven by loss observations and because unconstrained ETRs are more easily interpretable when pre-tax income is positive (Dyreng et al. 2017b), all firm-years with a negative pre-tax income are dropped.[97] Equations (1) - (4) are re-estimated using ETRs constrained to [0,1] and [-1,1] and the results (untabulated) are qualitatively similar to those in the primary analysis.

2.7.2 Alternative measures of the pre- and post-CBCR period

In the primary analysis, 2014 is the first year of the post-CBCR period because all sample firms publicly disclose CBCRs for 2014 onwards. However, most firms (53 firms or 73.6% of the sample, including all 14 GSIBs as required by Article 89) publicly disclose a limited CBCR of turnover, employees, and entities for the 2013 fiscal year.[98] Therefore, *POST_2012* is substituted for *POST* to capture this along with any changes in tax avoidance in the second half of 2013 in anticipation of the new disclosure rules. Equations (1) - (4) are re-estimated and all estimated coefficients on the variables of interest are statistically insignificant except two. The coefficient on *POST_2012* corresponding to Model (1) in Table 2.8 is -0.046 (*p*-value = 0.034) and the coefficient on *EU_BANK*POST_2012* corresponding to Model (1) in Table 2.9 is -0.057 (*p*-value = 0.098). These results suggest that EU banks did not alter their tax avoidance behaviour during 2013 in anticipation of impending CBCR requirements.

2.7.3 Alternative measures of tax havens

Following prior literature (Desai et al. 2006; Dyreng et al. 2016), I use an alternative list of tax havens initially developed by Hines and Rice (1994) who classify tax havens according to population. Small 'dot' ('Big 7') tax havens had populations of less than (more than) 1 million in 1982. The 'Big 7' tax havens were deemed to

[97] In the primary analysis I retain observations with negative pre-tax income to preserve sample size and because accounting losses do not necessarily translate to taxable losses.
[98] Differences in timing of the implementation of Article 89 of CRD IV into national legislation of Member States means that not all sample firms produce a CBCR in 2013. In addition, although required by national legislation, some firms do not produce a CBCR highlighting potential non-compliance.

have workforce's large enough to provide operational benefits, whereas the primary offering of 'dot' havens was thought to be tax minimisation. Given the passage of time and worldwide population growth since 1982, I follow similar logic but split the tax havens into the 'Big 12', defined as jurisdictions with populations exceeding 1.6 million as at December 2015, and all others 'dots'.[99]

The results from re-estimating Equations (5) and (6) are qualitatively similar to those in Tables 2.12 and 2.13, respectively. When re-estimating Equation (7), the coefficient on *THAV_TO* (Δ*THAV_TO)* corresponding to Panel A of Table 2.15 increases in magnitude and significance in all four models compared to the results using the extended tax haven list. For example, the estimated coefficient on *THAV_TO* in Model (1) is 4.425 (*p*-value = 0.000) and on Δ*THAV_TO* in Model (3) is 3.237 (*p*-value = 0.030). Furthermore, in Models (1) and (2), the coefficient on *THAV_EMP* is negative and significant at the 1% level indicating a disconnect between profits located in dot havens and employee numbers, although the coefficient on Δ*THAV_EMP* is insignificant. The results when re-estimating Equation (8) are qualitatively similar to those in Panel B of Table 2.15.

2.8 Conclusion

This study examines the effects of mandatory public CBCR on EU banks. The unanticipated introduction of CBCR is plausibly exogenous and provides an ideal setting for testing whether the cost-benefit equilibrium of tax avoidance alters for EU banks, and whether this induces changes in their tax avoidance behaviour. Overall, across a multitude of empirical tests, I find some evidence that EU banks, *increased* their tax avoidance in the post-CBCR period relative to EU insurers exempt from CBCR rules. Further tests reveal that the intensity of tax haven use as measured by the proportion of turnover and profit before tax recognised in tax havens, remains unchanged. However, I find a significant decrease in the number of tax haven entities used by listed firms. Overall, this evidence suggests that despite the increased transparency triggered by mandatory public CBCR, the benefits of tax avoidance for EU banks continued to outweigh the costs. Alternatively, it may simply be the case

[99] World population increased by 59.8% from 4.60bn in 1982 to 7.35bn in 2015 per UN statistics (available at: https://esa.un.org/unpd/wpp/Download/Standard/Population/). Appendix B identifies those tax havens used in the robustness tests.

that EU banks are largely compliant with prevailing tax law and CBCR has little impact on their tax avoidance behaviour. An unintended consequence of public CBCR is that firms can obtain more detailed information on the tax arrangements of competitors which may lead to mimicking and increased tax avoidance overall.

This study has several limitations. First, the sample size is relatively small, so the empirical tests may lack statistical power to detect some effects and results may not be generalizable to larger populations or to firms in other industries. Second, detailed tax return data are private and hence the tax avoidance proxies are constructed based on publicly-available financial statement data. The efficacy of such measures has been questioned (Hanlon and Heitzman 2010; Blouin 2014) but they are used in the absence of superior alternatives. Third, the empirical specifications may suffer the same complications as other studies of tax avoidance regarding endogeneity. However, I have attempted to address potential endogeneity and omitted correlated variables by employing changes specifications and by exploiting an exogenous shock to the financial transparency of EU banks. Finally, I have attempted to alleviate the methodological concern highlighted by Beatty and Liao (2014) regarding studies evaluating newly enacted bank regulation by comparing EU banks to a control group of EU insurers before and after the change. This allows me to more cleanly attribute any observed changes in tax avoidance behaviour to the new rules.

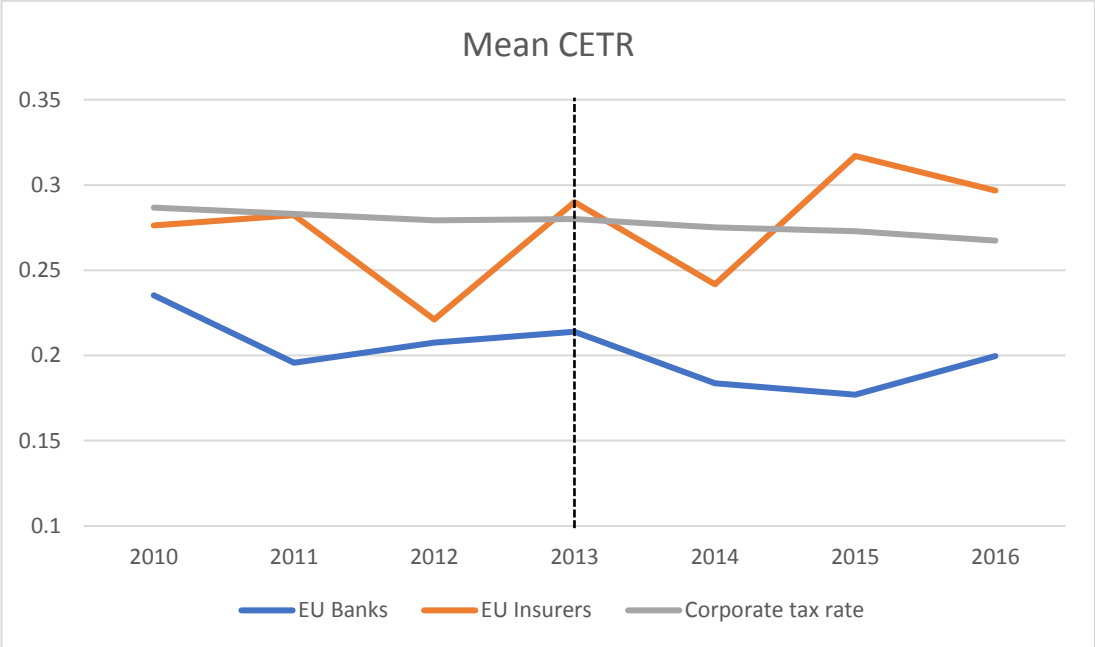
Nonetheless, this study informs the ongoing debate regarding mandatory public CBCR of tax data especially given EU regulator's current deliberations concerning the extension of these requirements to all EU firms. Evidently, public CBCR is not a panacea to improved transparency possibly because it does not directly inform stakeholders whether a firm adopted aggressive tax positions. Therefore, it will be interesting to compare the results of this study to the future influence (if any) of the OECD's more comprehensive CBCR initiative has on corporate tax avoidance. Future research could build on this study by extending the sample period to allow for the fact that many complex tax avoidance strategies take time to unwind and therefore changes in firm behaviour may only manifest over longer periods.

2.9 Tables and figures

Figure 2.1: Annual CETR over the sample period

Panel A (B) plots the annual mean (median) CETR and statutory corporate tax rate over the sample period.

Panel A: Mean CETR



Panel B: Median CETR

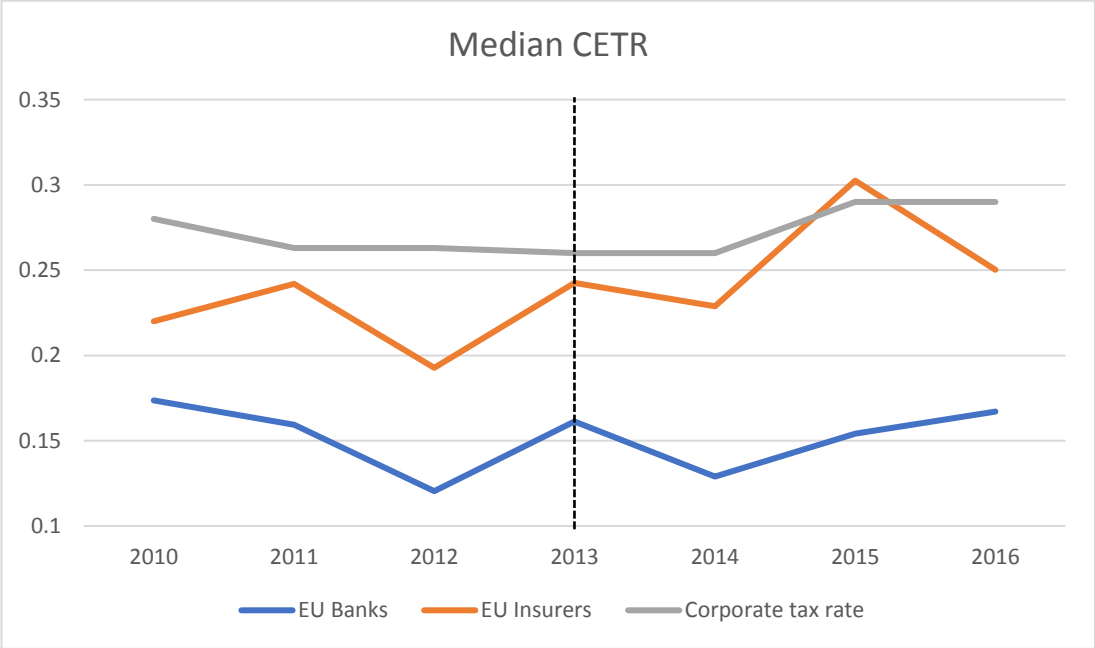
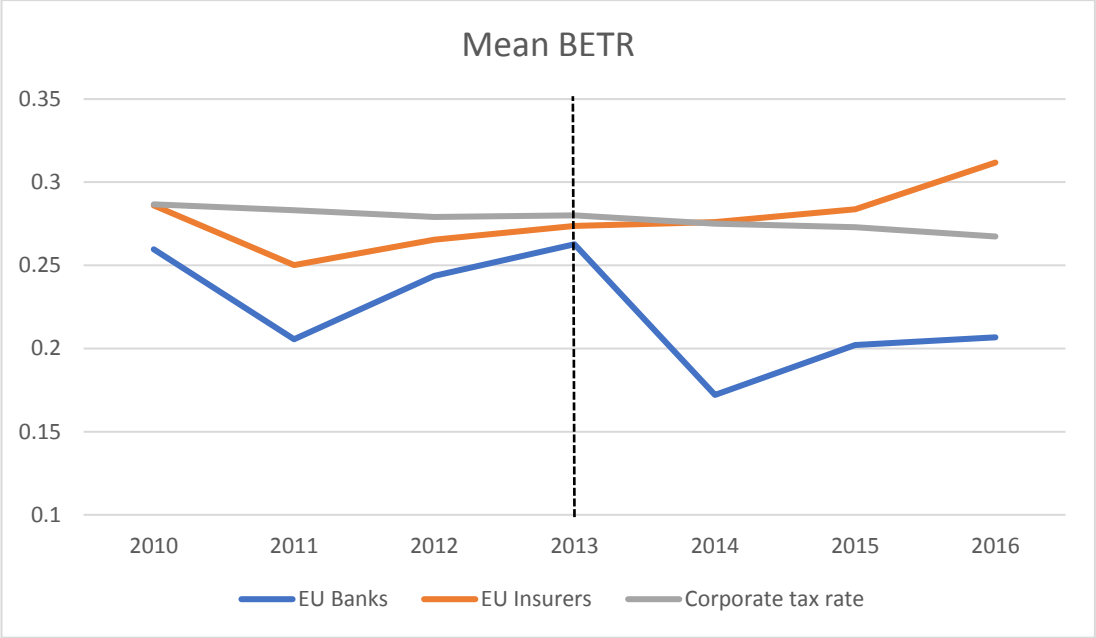


Figure 2.2: Annual BETR over the sample period

Panel A (B) plots the annual mean (median) BETR and statutory corporate tax rate over the sample period.

Panel A: Mean BETR



Panel B: Median BETR

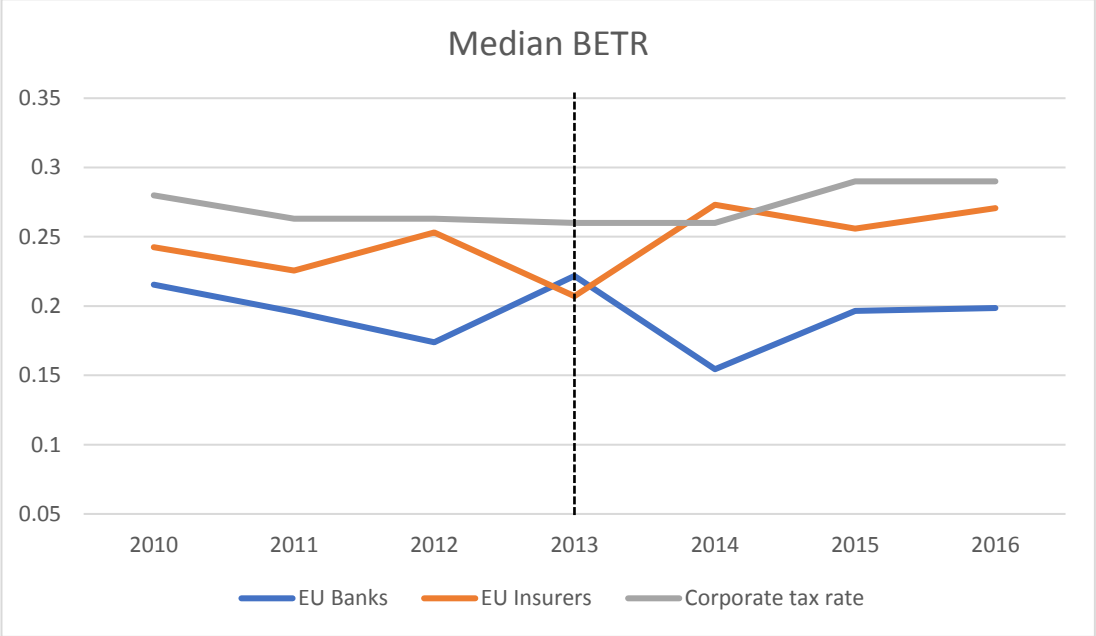


Table 2.1: Sample selection procedure

This table reports an overview of the sample selection process. Panel A outlines the sample selection procedure for the main sample of EU banks. Panel B outlines the sample selection procedure for the control sample of EU insurers.

Panel A: EU banks

Selection criteria	Firms
European Banking Authority (EBA) List of Institutions for Supervisory Reporting as at January 2016	198
Less: Firms from Norway not subject to CBCR disclosure rules	(3)
Less: Subsidiaries of firms headquartered in other EU countries to avoid double-counting e.g., HSBC appears in France and Malta despite it being a UK headquartered firm	(49)
Less: Subsidiaries of firms headquartered in non-EU countries for which consolidated IFRS financial statements are not available e.g., Goldman Sachs Group UK Limited	(22)
Less: Purely domestic firms (only operate in one country)	(36)
Less: Firms for which English language financial statements could not be obtained	(14)
Less: Firms for which no CBCR could be found	(4)
Less: Firms not collected due to small size of total assets	(7)
Less: Firms who commence or ceases business during the sample period	(3)
Add: Firms for which English language consolidated IFRS financial statements and CBCRs were readily found during the data collection process i.e., BKS Bank, BTV, CIC, Credit Agricole SA, Credit Suisse International Limited, Credit Suisse Securities (Europe) Limited, UBS Limited, Investec Bank, Natixis, Oberbank, Van Lanschot, Wustenrot & Wurttembergische	12
Final sample	72

Table 2.1: Sample selection procedure (continued)

This table reports an overview of the sample selection process. Panel A outlines the sample selection procedure for the main sample of EU banks. Panel B outlines the sample selection procedure for the control sample of EU insurers.

Panel B: EU insurers

Selection criteria	Firms
European Insurance and Occupational Pensions Authority (EIOPA) List of Identified Insurance Groups for Supervision as at November 2015	102
EU insurers downloaded from Datastream for the same 14 countries as the EU bank sample	106
	208
Less: Firms included in both lists	(27)
Less: Firms not reporting in all years due to business commencement, acquisition, or merger during the sample period	(52)
Less: Firms from EU countries not included in the primary sample of EU banks e.g., Finland, Poland	(6)
Less: Firms who are subsidiaries of EU banks	(23)
Less: Firms whose financial statements are not prepared in accordance with IFRS accounting standards	(23)
Less: Firms for which English language financial statements could not be obtained	(9)
Less: Firms from non-EU countries e.g., Norway, Switzerland, Bermuda (XL Group switched its domicile from Ireland to Bermuda during the sample period)	(8)
Less: Purely domestic firms (only operate in one country)	(6)
Less: Firms with missing data to calculate variables	(15)
Final sample	39

Table 2.2: Primary sample composition – EU banks

This table presents an overview of the primary sample. Panel A lists the firms in alphabetical order (with the 14 GSIBs listed first). Total assets are measured as at the end of the 2016 fiscal year (31 December 2016 for all firms except Investec Bank and Nationwide Building Society which have 31 March and 4 April year-ends respectively). Total assets reported in local currency are converted to Euros using the foreign exchange rate at fiscal year end. Panel B presents the sample composition by country. Panel C presents the split of total assets for the 2016 fiscal year by firm type.

Panel A: Primary sample composition by firm - EU banks

	Firm	Country	GSIB	Listed	Total Assets (€m)
1	Barclays	UK	Yes	Yes	1,421,746
2	BBVA	Spain	Yes*	Yes	731,856
3	BNP Paribas	France	Yes	Yes	2,076,959
4	Credit Agricole Group	France	Yes	No	1,722,849
5	Deutsche Bank	Germany	Yes	Yes	1,590,546
6	Groupe BPCE	France	Yes	No	1,235,240
7	HSBC	UK	Yes	Yes	2,257,345
8	ING Bank	Netherlands	Yes	No	843,919
9	Nordea	Sweden	Yes	Yes	613,778
10	Royal Bank of Scotland	UK	Yes	Yes	936,000
11	Santander	Spain	Yes	Yes	1,339,125
12	Societe Generale	France	Yes	Yes	1,382,241
13	Standard Chartered	UK	Yes	Yes	614,659
14	UniCredit	Italy	Yes	Yes	859,533
15	ABN AMRO	Netherlands	No	Yes	394,482
16	Allied Irish Banks	Ireland	No	Yes	95,622
17	Alpha Bank	Greece	No	Yes	64,872
18	Argenta Spaarbank	Belgium	No	No	36,156
19	Banca Monte dei Paschi di	Italy	No	Yes	153,178
20	Banco BPI Group	Portugal	No	Yes	38,727
21	Banco Comercial Portugues	Portugal	No	Yes	71,265
22	Banco Popolare Group	Italy	No	Yes	117,411
23	Banco Popolare Espanol	Spain	No	Yes	147,926
24	Banco Sabadell	Spain	No	Yes	212,508
25	Bank fur Tirol und Vorarlberg	Austria	No	Yes	10,014
26	Bank of Cyprus	Cyprus	No	Yes	22,172
27	Bank of Ireland	Ireland	No	Yes	123,129
28	Bankia SA	Spain	No	Yes	190,167
29	Bankinter	Spain	No	Yes	67,182
30	Bayerische Landesbank	Germany	No	No	212,150
31	Belfius Bank	Belgium	No	No	176,721
32	BKS Bank	Austria	No	Yes	7,581
33	CaixaBank Group	Spain	No	Yes	347,927
34	Caixa Geral de Depositos	Portugal	No	No	93,547

*BBVA was classified as a GSIB for all years in the sample period except 2016.

Table 2.2: Primary sample composition (continued)

Panel A: Primary sample composition by firm – EU banks (continued)

	Firm	Country	GSIB	Listed	Total Assets (€m)
35	CIC	France	No	Yes	269,316
36	Commerzbank	Germany	No	Yes	480,450
37	Credit Agricole SA	France	No	Yes	1,524,232
38	Credit Mutuel Group	France	No	No	793,522
39	Credit Suisse International	UK	No	No	315,875
40	Credit Suisse Securities (Europe)	UK	No	No	113,046
41	Danske Bank	Denmark	No	Yes	468,515
42	DekaBank	Germany	No	No	85,955
43	DZ Bank	Germany	No	No	509,447
44	Erste Group	Austria	No	Yes	208,227
45	Eurobank Ergasis	Greece	No	Yes	66,393
46	Gruppo UBI Banca	Italy	No	Yes	112,384
47	HSH Nordbank	Germany	No	No	84,365
48	Intesa Sanpaolo	Italy	No	Yes	725,100
49	Investec Bank	UK	No	No	21,537
50	Jyske Bank	Denmark	No	Yes	78,905
51	KBC Bank	Belgium	No	No	239,333
52	La Banque Postale	France	No	No	229,577
53	Landesbank Baden-Wurttemberg	Germany	No	No	243,620
54	Landesbank Hessen-Thuringen	Germany	No	No	165,164
55	Lloyds Banking Group	UK	No	Yes	958,428
56	National Bank of Greece	Greece	No	Yes	78,531
57	Nationwide Building Society	UK	No	No	258,567
58	Natixis	France	No	Yes	527,859
59	NORD/LB Norddeutsche	Germany	No	No	174,797
60	Nykredit Realkredit Group	Denmark	No	No	188,366
61	Oberbank	Austria	No	Yes	19,159
62	Piraeus Bank Group	Greece	No	Yes	81,501
63	Rabobank	Netherlands	No	No	662,593
64	Raiffeisen Bank International	Austria	No	Yes	111,864
65	Skandinaviska Enkilda Banken	Sweden	No	Yes	273,462
66	Svenska Handelsbanken	Sweden	No	Yes	274,185
67	Swedbank	Sweden	No	Yes	224,789
68	Sydbank	Denmark	No	Yes	19,728
69	UBS Limited	UK	No	No	47,656
70	Van Lanschot	Netherlands	No	Yes	14,877
71	Volkswagen Financial Services	Germany	No	No	130,148
72	Wustenrot & Wurttembergische	Germany	No	Yes	72,276
					31,062,283

Table 2.2: Primary sample composition (continued)

Panel B: Primary sample composition by country – EU banks

Country	Firms	%	GSIBs	%	Listed	%	Total Assets (€m)	%
Austria	5	6.9%	0	0.0%	5	10.4%	356,844	1.1%
Belgium	3	4.2%	0	0.0%	0	0.0%	452,210	1.5%
Cyprus	1	1.4%	0	0.0%	1	2.1%	22,172	0.1%
Denmark	4	5.6%	0	0.0%	3	6.3%	755,514	2.4%
France	9	12.5%	4	28.6%	5	10.4%	9,761,795	31.4%
Germany	11	15.3%	1	7.1%	3	6.3%	3,748,917	12.1%
Greece	4	5.6%	0	0.0%	4	8.3%	291,297	0.9%
Ireland	2	2.8%	0	0.0%	2	4.2%	218,751	0.7%
Italy	5	6.9%	1	7.1%	5	10.4%	1,967,606	6.3%
Netherlands	4	5.6%	1	7.1%	2	4.2%	1,915,871	6.2%
Portugal	3	4.2%	0	0.0%	2	4.2%	203,540	0.7%
Spain	7	9.7%	2	14.3%	7	14.6%	3,036,692	9.8%
Sweden	4	5.6%	1	7.1%	4	8.3%	1,386,214	4.5%
UK	10	13.9%	4	28.6%	5	10.4%	6,944,859	22.3%
Total	72	100.0%	14	100.0%	48	100.0%	31,062,283	100.0%

Panel C: Total assets by firm type – EU banks (2016 fiscal year)

Firm type	Mean (€m)	Median (€m)	Min (€m)	Max (€m)
GSIB	1,258,985	1,287,183	613,778	2,257,345
Non-GSIB	231,664	150,552	7,581	1,524,232
Listed	468,294	210,367	7,581	2,257,345
Unlisted	357,673	200,258	21,537	1,722,849
All firms	431,421	210,189	7,581	2,257,345

Table 2.3: Control sample composition – EU insurers

This table presents an overview of the control sample. Panel A lists the firms in alphabetical order. Total assets are measured as at the end of the 2016 fiscal year (31 December 2016 for all firms). Total assets reported in local currency are converted to Euros using the foreign exchange rate at fiscal year end. Panel B presents the sample composition by country. Panel C presents the split of total assets by firm type.

Panel A: Control sample composition by firm - EU insurers

	Firm	Country	Listed	Total Assets (€m)
1	Achmea	Netherlands	N	91,015
2	ACHP	UK	Y	28
3	Admiral Group	UK	Y	4,367
4	Aegon	Netherlands	Y	414,640
5	Ageas	Belgium	Y	103,459
6	Allianz	Germany	Y	864,489
7	Amlin	UK	Y	11,615
8	APRILl	France	Y	1,420
9	Assicurazioni Generali	Italy	Y	513,611
10	Aviva	UK	Y	506,784
11	AXA	France	Y	876,378
12	Beazley	UK	Y	5,622
13	BUPA	UK	N	15,833
14	Cattolica Ass	Italy	Y	22,987
15	Chesnara	UK	Y	6,799
16	CNP Assurances	France	Y	395,081
17	Delta Lloyd	Netherlands	Y	75,401
18	Euler Hermes	France	Y	5,180
19	Groupama	France	N	90,484
20	Grupo Catalana	Spain	Y	12,921
21	Hannover Re	Germany	Y	60,277
22	Jardine Lloyd Thompson	UK	Y	2,994
23	Legal & General	UK	Y	542,039
24	MAPFRE	Spain	Y	63,612
25	Munich Re	Germany	Y	256,336
26	Novae Group	UK	Y	2,323
27	Old Mutual	UK	Y	197,309
28	Phoenix Group	UK	Y	96,150
29	Prudential	UK	Y	546,352
30	RSA Insurance Group	UK	Y	21,819
31	SCOR	France	Y	41,248
32	St James's Place	UK	Y	87,595
33	Standard Life	UK	Y	216,893
34	Talanx	Germany	Y	148,036
35	Tryg	Denmark	Y	6,432

Table 2.3: Control sample composition – EU insurers (continued)

Panel A: Control sample composition by firm - EU insurers (continued)

	Firm	Country	Listed	Total Assets (€m)
36	Unipol Gruppo	Italy	Y	89,911
37	UNIQA Insurance	Austria	Y	32,990
38	Vienna Insurance	Austria	Y	48,885
39	Vittoria Assicurazioni	Italy	Y	3,582
				6,484,878

Panel B: Control sample composition by country – EU insurers

Country	Firms	%	Listed	%	Total Assets (€m)	%
Austria	2	5.1%	2	5.6%	81,875	1.3%
Belgium	1	2.6%	1	2.8%	103,459	1.6%
Denmark	1	2.6%	1	2.8%	6,432	0.1%
France	6	15.3%	5	13.8%	1,409,791	21.7%
Germany	4	10.3%	4	11.1%	1,329,138	20.5%
Italy	4	10.3%	4	11.1%	630,091	9.7%
Netherlands	3	7.7%	2	5.6%	583,056	9.0%
Spain	2	5.1%	2	5.6%	76,533	1.2%
UK	16	41.0%	15	41.6%	2,264,502	34.9%
Total	39	100.0%	36	100.0%	6,484,878	100.0%

Panel C: Total assets by firm type – EU insurers (2016 fiscal year)

Firm type	Mean (€m)	Median (€m)	Min (€m)	Max (€m)
All firms	166,279	63,612	28	876,378

Table 2.4: Summary statistics

This table presents summary statistics for the variables used in the analysis. Data for THAV_TO, THAV_PBT, and THAV_ENT is only available for 2013-2016. All continuous variables are winsorized at the 1% and 99% level. Significant differences in the means and medians are based on two-sided *t*-tests and Wilcoxon median tests, respectively. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix D.

	Full sample (111 firms)						EU Banks (72 firms)			EU Insurers (39 firms)		
	Obs.	Mean	SD	P25	P50	P75	Obs.	Mean	Median	Obs.	Mean	Median
CETR	777	0.228	0.235	0.025	0.188	0.315	504	0.202	0.156	273	0.275***	0.238***
BETR	777	0.242	0.229	0.067	0.215	0.313	504	0.222	0.197	273	0.278***	0.249***
THAV_TO	269	0.051	0.079	0.001	0.019	0.071	269	0.051	0.019	-	-	-
THAV_PBT	228	0.073	0.222	0.000	0.012	0.088	228	0.073	0.012	-	-	-
THAV_ENT	288	0.175	0.158	0.065	0.142	0.239	288	0.175	0.142	-	-	-
POST	777	0.429	0.495	0.000	0.000	1.000	504	0.429	0.495	273	0.429	0.496
SIZE	777	18.581	1.750	17.612	18.832	19.822	504	19.168	19.175	273	17.497***	17.767***
ROA	777	0.008	0.021	0.002	0.005	0.009	504	0.001	0.003	273	0.020***	0.010***
LEV	777	0.913	0.083	0.910	0.939	0.956	504	0.940	0.945	273	0.863***	0.909***
INTANG	777	0.018	0.039	0.002	0.006	0.017	504	0.006	0.004	273	0.040***	0.020***
CAPINT	777	0.010	0.001	0.002	0.005	0.010	504	0.006	0.005	273	0.017***	0.006**
REVGRTH	777	0.022	0.303	-0.085	-0.013	0.062	504	-0.028	-0.037	273	0.114***	0.034***
ΔTLCF	777	0.000	0.001	-0.000	0.000	0.000	504	0.000	0.000	273	-0.000	0.000
TLCF_DUM	777	0.837	0.370	1.000	1.000	1.000	504	0.851	1.000	273	0.810	1.000
TAX_RATE	777	0.278	0.055	0.250	0.285	0.314	504	0.278	0.300	273	0.277	0.260
TAX_ENF	777	4.496	1.612	3.380	4.560	5.940	504	4.484	4.530	273	4.519	4.830

Table 2.5: Correlations matrix

This table presents the correlations between the variables. Pearson correlation coefficients are shown below the diagonal while Spearman correlation coefficients are shown above the diagonal. Significant (p-value < 0.05) coefficients are reported in bold. All variables are defined in Appendix D.

Panel A: Tax avoidance and CBCR (n=777)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	CETR		**0.632**	0.015	0.067	**0.316**	-0.066	**0.174**	0.057	0.044	-0.053	-0.035	**0.152**	-0.018
(2)	BETR	**0.615**		-0.012	0.059	**0.288**	-0.051	**0.183**	**0.086**	**0.081**	-0.043	**-0.092**	**0.188**	**-0.082**
(3)	POST	-0.023	-0.053		0.005	**0.126**	**-0.157**	-0.064	-0.008	**-0.071**	-0.070	-0.004	**-0.104**	**0.155**
(4)	SIZE	0.044	0.053	0.014		**-0.332**	**0.551**	**-0.178**	**-0.221**	**-0.119**	-0.049	**0.229**	**0.211**	0.010
(5)	ROA	**0.145**	**0.125**	0.054	**-0.457**		**-0.514**	**0.321**	**0.185**	**0.329**	**-0.145**	0.005	-0.011	**0.098**
(6)	LEV	**-0.076**	-0.048	-0.051	**0.643**	**-0.600**		**-0.500**	**-0.514**	**-0.159**	-0.019	-0.053	**0.092**	**0.077**
(7)	INTANG	**0.117**	**0.108**	-0.018	**-0.440**	**0.507**	**-0.671**		**0.405**	**0.214**	0.017	0.063	0.070	**-0.275**
(8)	CAPINT	**0.097**	**0.089**	-0.004	**-0.297**	**0.247**	**-0.461**	**0.483**		**0.094**	0.036	**0.115**	**0.109**	**-0.370**
(9)	REVGRTH	**-0.083**	0.014	-0.038	**-0.086**	**0.102**	-0.033	0.053	0.018		0.044	-0.016	0.045	-0.053
(10)	ΔTLCF	**-0.109**	-0.005	**-0.108**	-0.000	**-0.180**	0.025	0.011	0.008	0.008		**-0.168**	-0.012	**-0.114**
(11)	TLCF_DUM	-0.029	-0.057	-0.004	**0.207**	0.028	-0.024	0.021	-0.004	**-0.071**	-0.048		-0.018	**0.078**
(12)	TAX_RATE	**0.151**	**0.169**	**-0.094**	**0.197**	**0.073**	0.011	0.005	-0.003	-0.048	-0.052	-0.040		**-0.461**
(13)	TAX_ENF	-0.060	**-0.089**	**0.140**	0.007	**0.110**	0.059	**-0.074**	**-0.170**	0.003	**-0.103**	**0.070**	**-0.426**	

Table 2.5: Correlations matrix (continued)

This table presents the correlations between the variables. Pearson correlation coefficients are shown below the diagonal while Spearman correlation coefficients are shown above the diagonal. Significant (*p*-value < 0.05) coefficients are reported in bold. All variables are defined in Appendix D.

Panel B: Tax haven use and CBCR (*n*=228)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	THAV_TO		**0.650**	**0.581**	-0.007	**0.427**	0.045	**0.253**	**0.167**	**-0.207**	0.126	0.057	0.119	0.096	**0.136**
(2)	THAV_PBT	**0.601**		**0.297**	-0.007	**0.430**	**0.173**	0.184	**0.180**	-0.106	0.081	0.005	0.097	**0.156**	0.115
(3)	THAV_ENT	**0.566**	**0.258**		-0.047	0.025	-0.085	0.074	-0.038	**-0.146**	0.050	0.055	0.120	-0.008	**0.136**
(4)	POST	-0.018	-0.047	-0.015		-0.065	-0.049	-0.081	-0.098	-0.003	**0.145**	0.100	-0.058	0.057	-0.038
(5)	SIZE	**0.215**	**0.215**	0.001	0.014		-0.097	**0.420**	**0.422**	-0.125	**0.136**	-0.033	**0.230**	**0.149**	0.005
(6)	ROA	0.080	0.060	0.017	0.054	**-0.457**		**-0.182**	-0.032	-0.115	**0.259**	-0.086	-0.091	**-0.151**	**0.306**
(7)	LEV	0.082	0.077	0.093	-0.051	**0.643**	**-0.600**		**-0.217**	**-0.481**	0.047	0.084	-0.119	**0.319**	**0.264**
(8)	INTANG	0.037	0.013	**-0.124**	-0.018	**-0.440**	**0.507**	**-0.671**		**0.243**	0.050	-0.068	**0.232**	0.047	**-0.296**
(9)	CAPINT	-0.105	-0.116	**-0.187**	-0.004	**-0.297**	**0.247**	**-0.461**	**0.483**		-0.099	-0.094	**0.204**	**0.156**	**-0.574**
(10)	REVGRTH	0.025	-0.038	0.051	-0.038	**-0.086**	**0.102**	-0.033	0.053	0.018		**0.170**	-0.028	0.088	0.006
(11)	ΔTLCF	0.021	0.013	0.013	**-0.108**	-0.000	**-0.180**	0.025	0.011	0.008	0.008		**-0.241**	0.109	-0.049
(12)	TLCF_DUM	0.036	0.003	-0.034	-0.004	**0.207**	0.028	-0.024	0.021	-0.004	**-0.071**	-0.048		0.071	-0.008
(13)	TAX_RATE	0.030	-0.009	-0.028	**-0.094**	**0.197**	**0.073**	0.011	0.005	-0.003	-0.048	-0.052	-0.040		**-0.470**
(14)	TAX_ENF	0.102	0.094	0.090	**0.140**	0.007	**0.110**	0.059	**-0.074**	**-0.170**	0.003	**-0.103**	**0.070**	**-0.426**	

Table 2.6: Tax haven activities disclosed in CBCRs

This table reports the location of the key CBCR disclosure items. Panel A reports the results for entities and Panel B reports the results for turnover, profit before tax, and employees.

Panel A: Location of disclosed entities

Year	Obs.	Countries total (1)	Countries mean (2)	Change 2013 - 2016 (3)	Entities total (4)	Entities mean (5)	Change 2013 - 2016 (6)	Tax haven entities (7)	Tax haven entities mean (8)	Change 2013 - 2016 (9)	Tax haven entities (%) (10)
2013	72	1,460	20.3		17,218	239.1		3,174	44.1		18.4%
2014	72	1,461	20.3		16,867	234.3		3,077	42.7		18.2%
2015	72	1,421	19.7		15,790	219.3		2,829	39.3		17.9%
2016	72	1,389	20.7	2.2%	14,795	205.5	-14.1%	2,465	34.2	-22.3%	16.7%
	288	5,731	19.9		64,670	224.5		11,545	40.1		17.9%

Panel B: Location of disclosed turnover, profit before tax, and employees

	Turnover				Profit before tax (PBT)				Employees			
Year	Obs.	Turnover (€m) (1)	Tax haven turnover (€m) (2)	Tax haven % (3)	Obs.	PBT (€m) (4)	Tax haven PBT (€m) (5)	Tax haven % (6)	Obs.	Employees (7)	Tax haven employees (8)	Tax haven % (9)
2013	53	611,395	48,633	8.0%	14	18,618	-334	-1.8%	53	2,665,462	119,296	4.5%
2014	72	656,449	48,810	7.4%	70	104,332	20,202	19.4%	72	2,842,961	129,607	4.6%
2015	72	697,759	55,604	8.0%	72	122,156	23,894	19.6%	72	2,843,912	129,161	4.5%
2016	72	664,509	52,704	7.9%	72	104,504	20,845	19.9%	72	2,739,855	126,473	4.6%
	269	2,630,112	205,752	7.8%	228	349,611	64,608	18.5%	269	11,092,190	504,537	4.5%

Table 2.7: Corporate tax avoidance and the implementation of CBCR (Univariate results)

This table reports the means and the difference in means for key tax avoidance related variables pre- and post the implementation of CBCR requirements. The post period is defined as the years after the new requirements were implemented (2014-2016). Panel A reports the results for all firms, Panel B (Panel C) for EU banks (EU insurers), and Panel D (Panel E) for listed EU banks (unlisted EU banks). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-sided *t*-tests. All variables are defined in Appendix D.

	Panel A: All sample firms				Panel B: EU Banks				Panel C: EU Insurers			
Variable	Mean (Pre) *n*=444	Mean (Post) *n*=333	Difference	*p*-value	Mean (Pre) *n*=288	Mean (Post) *n*=216	Difference	*p*-value	Mean (Pre) *n*=156	Mean (Post) *n*=117	Difference	*p*-value
CETR	0.232	0.221	-0.011	0.524	0.213	0.187	-0.026	0.208	0.267	0.285	0.018	0.532
BETR	0.252	0.228	-0.024	0.141	0.243	0.194	-0.049**	0.016	0.269	0.291	0.022	0.434
TAX_RATE	0.282	0.272	-0.010***	0.009	0.281	0.275	-0.006	0.281	0.285	0.265	-0.020***	0.003
TAX_ENF	4.301	4.756	0.455***	0.000	4.298	4.732	0.434***	0.004	4.307	4.801	0.493***	0.006

	Panel D: Listed EU Banks				Panel E: Unlisted EU Banks			
Variable	Mean (Pre) *n*=192	Mean (Post) *n*=144	Difference	*p*-value	Mean (Pre) *n*=96	Mean (Post) *n*=72	Difference	*p*-value
CETR	0.192	0.186	-0.006	0.823	0.255	0.188	-0.067*	0.056
BETR	0.238	0.195	-0.043	0.103	0.253	0.191	-0.062*	0.050
TAX_RATE	0.271	0.268	-0.003	0.598	0.300	0.290	-0.010	0.209
TAX_ENF	4.090	4.432	0.342*	0.082	4.715	5.331	0.616***	0.002

Table 2.8: Corporate tax avoidance and CBCR (EU banks)

This table reports the results from estimating Equation (1) from 2010 to 2016 via OLS. The dependent variable is CETR or BETR. All variables are defined in Appendix D. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Dep. Var.	CETR		BETR	
Variables	(1)	(2)	(3)	(4)
POST	-0.044**	-0.039*	-0.044**	-0.050**
	(0.027)	(0.089)	(0.028)	(0.019)
SIZE	0.028***	0.026**	0.017*	0.016
	(0.006)	(0.043)	(0.085)	(0.166)
ROA	2.745***	2.595*	4.296***	4.314***
	(0.005)	(0.054)	(0.000)	(0.001)
LEV	-0.183	-0.423	0.401	0.233
	(0.739)	(0.502)	(0.412)	(0.683)
INTANG	2.347	4.204	6.846***	6.848**
	(0.347)	(0.106)	(0.004)	(0.010)
CAPINT	4.048	4.728	5.010**	3.862
	(0.122)	(0.153)	(0.049)	(0.230)
REVGRTH	-0.024	-0.048	-0.012	-0.036
	(0.752)	(0.515)	(0.852)	(0.547)
ΔTLCF	-17.139**	-15.811*	15.109	15.606
	(0.027)	(0.078)	(0.155)	(0.121)
TLCF_DUM	-0.030	-0.044	-0.055**	-0.051*
	(0.291)	(0.118)	(0.026)	(0.060)
TAX_RATE	0.483**	-0.006	0.498**	-0.619
	(0.020)	(0.993)	(0.015)	(0.267)
TAX_ENF	0.017*	-0.002	0.017*	0.011
	(0.066)	(0.912)	(0.064)	(0.386)
Intercept	-0.363	0.013	-0.706*	-0.379
	(0.419)	(0.981)	(0.079)	(0.481)
Country fixed effects	N	Y	N	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	504	504	504	504
Adj. R^2	0.086	0.108	0.116	0.134

Table 2.9: Corporate tax avoidance and CBCR (EU banks vs. EU insurers)

This table reports the results from estimating Equation (2) from 2010 to 2016 via OLS. The dependent variable is CETR or BETR. All variables are defined in Appendix D. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Dep. Var.	CETR		BETR	
Variables	(1)	(2)	(3)	(4)
EU_BANK	-0.066**	-0.060**	-0.026	-0.023
	(0.013)	(0.044)	(0.317)	(0.410)
EU_BANK*POST	-0.048	-0.041	-0.074**	-0.062*
	(0.145)	(0.258)	(0.026)	(0.056)
SIZE	0.028***	0.025***	0.025***	0.022***
	(0.000)	(0.001)	(0.000)	(0.003)
ROA	1.296***	1.057**	1.449***	1.091**
	(0.004)	(0.044)	(0.002)	(0.032)
LEV	-0.034	-0.014	0.065	0.048
	(0.832)	(0.935)	(0.691)	(0.770)
INTANG	0.282	0.280	0.363*	0.364*
	(0.173)	(0.200)	(0.082)	(0.097)
CAPINT	0.647*	0.589*	0.608*	0.429
	(0.053)	(0.089)	(0.077)	(0.264)
REVGRTH	-0.096***	-0.099***	-0.012	-0.013
	(0.000)	(0.000)	(0.691)	(0.675)
ΔTLCF	-14.842**	-13.794**	2.595	3.396
	(0.021)	(0.037)	(0.748)	(0.661)
TLCF_DUM	-0.049**	-0.038	-0.056**	-0.038
	(0.035)	(0.120)	(0.010)	(0.106)
TAX_RATE	0.354**	-0.163	0.429**	-0.308
	(0.032)	(0.759)	(0.010)	(0.510)
TAX_ENF	-0.002	-0.006	-0.006	0.000
	(0.747)	(0.753)	(0.360)	(0.990)
Intercept	-0.276*	-0.200	-0.327**	-0.228
	(0.058)	(0.270)	(0.020)	(0.190)
Country fixed effects	N	Y	N	Y
Year fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	777	777	777	777
Adj. R^2	0.085	0.093	0.070	0.084

Table 2.10: Corporate tax avoidance and CBCR (Firm fixed effects)

This table reports the results from estimating Equations (1) and (2) from 2010 to 2016 via OLS. The dependent variable is CETR or BETR. Panel A (Panel B) reports the results from estimating Equation (1) (Equation (2)). All variables are defined in Appendix D. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: Equation (1) – EU Banks

Dep. Var.	CETR	BETR
Variables	(1)	(2)
POST	-0.032	-0.036
	(0.186)	(0.138)
Intercept	-2.110	-2.185
	(0.121)	(0.180)
Controls	Y	Y
Firm fixed effects	Y	Y
Bootstrapped standard errors	Y	Y
Observations	504	504
Adj. R^2	0.166	0.184

Panel B: Equation (2) – EU Banks vs. EU Insurers

Dep. Var.	CETR	BETR
Variables	(1)	(2)
EU_BANK*POST	-0.032	-0.045
	(0.346)	(0.218)
Intercept	-0.932	-1.616
	(0.446)	(0.214)
Controls	Y	Y
Firm fixed effects	Y	Y
Year fixed effects	Y	Y
Bootstrapped standard errors	Y	Y
Observations	777	777
Adj. R^2	0.218	0.188

Table 2.11: Changes in corporate tax avoidance and CBCR

This table reports the results from estimating Equations (3) and (4) from 2010 to 2016 via OLS. The dependent variable is ΔCETR or ΔBETR. Panel A (Panel B) reports the results from estimating Equation (3) (Equation (4)). All variables are defined in Appendix D. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: Equation (3) – EU Banks

Dep. Var.	ΔCETR		ΔBETR	
Variables	(1)	(2)	(3)	(4)
POST	-0.010	-0.009	-0.014	-0.012
	(0.724)	(0.753)	(0.613)	(0.650)
Intercept	0.012	-0.019	0.008	0.042
	(0.531)	(0.734)	(0.679)	(0.554)
ΔControls	Y	Y	Y	Y
Country fixed effects	N	Y	N	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	503	503	503	503
Adj. R^2	0.026	0.004	0.043	0.021

Panel B: Equation (4) – EU Banks vs. EU Insurers

Dep. Var.	ΔCETR		ΔBETR	
Variables	(1)	(2)	(3)	(4)
EU_BANK	-0.022	-0.020	0.007	0.007
	(0.483)	(0.565)	(0.812)	(0.833)
EU_BANK*POST	0.012	0.012	-0.034	-0.033
	(0.786)	(0.782)	(0.414)	(0.423)
Intercept	0.075*	0.028	-0.007	0.003
	(0.099)	(0.673)	(0.881)	(0.968)
ΔControls	Y	Y	Y	Y
Country fixed effects	N	Y	N	Y
Year fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	775	775	775	775
Adj. R^2	0.045	0.032	0.015	0.002

Table 2.12: Tax haven use after the implementation of CBCR

This table reports the results from estimating Equation (5) from 2013 to 2016 via OLS. All variables are defined in Appendix D. Panel A (Panel B) reports the results for all EU banks (EU banks that use tax havens). Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: All EU banks

Dep. Var.	THAV_TO			THAV_PBT			THAV_ENT		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
POST_2014	-0.001	0.002	0.001	-0.030	-0.033	-0.023	-0.009	-0.009	-0.012
	(0.909)	(0.821)	(0.916)	(0.322)	(0.301)	(0.436)	(0.624)	(0.501)	(0.345)
Intercept	0.051***	0.000	0.098	0.093***	0.015	-0.765	0.180***	0.019**	0.418
	(0.000)	(0.997)	(0.590)	(0.001)	(0.572)	(0.248)	(0.000)	(0.019)	(0.210)
Controls	N	N	Y	N	N	Y	N	N	Y
Country fixed effects	N	Y	Y	N	Y	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	269	269	269	228	228	228	288	288	288
Adj. R^2	0.000	0.197	0.207	0.000	0.039	0.048	0.000	0.426	0.419

Panel B: EU banks using tax havens (THAV≠ 0)

Dep. Var.	THAV_TO			THAV_PBT			THAV_ENT		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
POST_2014	0.001	0.002	0.004	-0.037	-0.035	-0.022	-0.010	-0.010	-0.012
	(0.963)	(0.843)	(0.713)	(0.342)	(0.404)	(0.605)	(0.614)	(0.497)	(0.367)
Intercept	0.063***	-0.000	-0.011	0.116***	0.017	-0.988	0.190***	0.019**	0.493
	(0.000)	(0.987)	(0.962)	(0.000)	(0.624)	(0.282)	(0.000)	(0.031)	(0.159)
Controls	N	N	Y	N	N	Y	N	N	Y
Country fixed effects	N	Y	Y	N	Y	Y	N	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	216	216	216	180	180	180	272	272	272
Adj. R^2	0.000	0.120	0.122	0.000	0.008	0.022	0.000	0.404	0.398

Table 2.13: Tax haven use after the implementation of CBCR

This table reports the results from estimating Equation (6) from 2013 to 2016 via OLS. All variables are defined in Appendix D. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Dep. Var.	THAV_TO		THAV_PBT		THAV_ENT	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
YEAR_2014	0.005	0.005	-0.005	-0.027	-0.003	-0.003
	(0.718)	(0.788)	(0.954)	(0.834)	(0.887)	(0.883)
YEAR_2015	0.005	0.006	-0.047	-0.079	-0.007	-0.006
	(0.707)	(0.744)	(0.602)	(0.559)	(0.754)	(0.776)
YEAR_2016	0.004	0.009	-0.004	-0.012	-0.021	-0.022
	(0.767)	(0.635)	(0.964)	(0.929)	(0.328)	(0.315)
Intercept	0.079	-0.033	-0.834	-0.969	0.451	0.529
	(0.691)	(0.901)	(0.229)	(0.319)	(0.188)	(0.146)
Controls	Y	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y	Y
Conditional on tax haven use	N	Y	N	Y	N	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y	Y
Observations	269	216	228	180	288	272
Adj. R^2	0.201	0.113	0.045	0.021	0.415	0.395

Table 2.14: Corporate tax avoidance and CBCR (Listed vs. unlisted EU banks)

This table reports the results from estimating Equation (1) from 2013 to 2016 via OLS. All variables are defined in Appendix D. Panel A (Panel B) reports the results when CETR (BETR) is the dependent variable. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: CETR

Variables	Listed EU banks			Unlisted EU banks		
POST	-0.034	-0.029	-0.028	-0.079**	-0.058	-0.042
	(0.179)	(0.289)	(0.395)	(0.028)	(0.124)	(0.395)
Intercept	-0.518	-0.143	-2.965	-0.731	-0.262	-0.847
	(0.282)	(0.830)	(0.144)	(0.486)	(0.822)	(0.778)
Controls	Y	Y	Y	Y	Y	Y
Country fixed effects	N	Y	N	N	Y	N
Firm fixed effects	N	N	Y	N	N	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y	Y
Observations	336	336	336	168	168	168
Adj. R^2	0.104	0.095	0.162	0.085	0.134	0.168

Panel B: BETR

Variables	Listed EU banks			Unlisted EU banks		
POST	-0.034	-0.044	-0.032	-0.085***	-0.068**	-0.076*
	(0.194)	(0.122)	(0.317)	(0.004)	(0.032)	(0.077)
Intercept	-1.121***	-0.875	-2.989	0.574	1.124	1.217
	(0.007)	(0.130)	(0.218)	(0.585)	(0.253)	(0.530)
Controls	Y	Y	Y	Y	Y	Y
Country fixed effects	N	Y	N	N	Y	N
Firm fixed effects	N	N	Y	N	N	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y	Y
Observations	336	336	336	168	168	168
Adj. R^2	0.124	0.128	0.198	0.160	0.211	0.210

Table 2.15: Additional analysis

Panel A and Panel B report the results from estimating Equations (7) and (8) from 2013 to 2016 via OLS, respectively. In Panel A, the dependent variable is THAV_PBT or ΔTHAV_PBT. In Panel B, the dependent variable is NUM_TH_ENTS or ΔNUM_TH_ENTS. All variables are defined in Appendix D. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are computed based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: Disconnect between the location of tax haven profits and real operations

Dep. Var	THAV_PBT		ΔTHAV_PBT	
Variables	(1)	(2)	(3)	(4)
THAV_TO / ΔTHAV_TO	1.779***	1.736***	2.192	2.466
	(0.000)	(0.000)	(0.149)	(0.134)
THAV_EMP / ΔTHAV_EMP	-0.343	-0.294	4.003	3.523
	(0.359)	(0.488)	(0.294)	(0.378)
Intercept	-0.888	-1.204	0.014	0.046
	(0.142)	(0.177)	(0.941)	(0.886)
Controls / ΔControls	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y
Conditional on tax haven use	N	Y	N	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	227	170	155	115
Adj. R^2	0.348	0.314	0.000	0.000

Panel B: Changes in tax haven entities

Dep. Var.	NUM_TH_ENTS		ΔNUM_TH_ENTS	
Variables	(1)	(2)	(3)	(4)
NUM_ENTS / ΔNUM_ENTS	0.176***	0.172***	0.181***	0.182***
	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	-14.884	-70.308	-10.797*	-10.884
	(0.853)	(0.397)	(0.092)	(0.104)
Controls / ΔControls	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y
Conditional on tax haven use	N	Y	N	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	288	272	216	204
Adj. R^2	0.787	0.785	0.509	0.506

Table 2.16: Abnormal returns around adoption of CRD IV

Panel A: Market-adjusted mean abnormal returns (AR) (daily)

Panel A presents *t*-tests on whether daily ARs are different from 0. AR is calculated per Equation (9). Event day '0' represents the day of public disclosure of the event. *N* is the number of observations. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

			Local Index				EU Index			
Event	Event day	*N*	AR	*p*-value	# neg AR	% neg AR	AR	*p*-value	# neg AR	% neg AR
1	-1	49	0.23%	0.650	24	49.0%	0.45%	0.368	22	44.9%
1	0	49	0.10%	0.761	24	49.0%	-0.05%	0.879	28	57.1%
1	1	49	-0.48%	0.168	34	69.4%	-0.70%**	0.052	31	63.3%
1	2	49	-0.97%***	0.003	33	67.3%	-1.04%***	0.007	26	53.1%
1	3	49	-0.50%*	0.099	27	55.1%	-0.61%*	0.074	27	55.1%
2	-1	49	-0.18%	0.779	18	38.8%	-0.33%	0.629	25	51.0%
2	0	49	-1.47%**	0.019	38	77.6%	-1.46%**	0.026	33	67.3%
2	1	49	-0.22%	0.390	25	51.0%	-0.09%	0.776	27	55.1%
2	2	49	-0.39%	0.203	27	57.1%	-0.29%	0.374	28	57.1%
2	3	49	-0.05%	0.916	29	59.2%	-0.26%	0.621	27	55.1%

Panel B: Significance tests on market-adjusted cumulative abnormal returns (CAR)

Panel B presents *t*-tests of CARs being different from 0. CAR is calculated per Equation (10). Event window represents the days around the day of public disclosure of the event. *N* is the number of observations. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

			Local Index		EU Index	
Event	Event window	*N*	CAR	*p*-value	CAR	*p*-value
1	-1 to 1	49	-0.15%	0.809	-0.31%	0.620
1	-1 to 2	49	-1.12%*	0.072	1.35%**	0.043
1	-1 to 3	49	-1.62%***	0.009	-1.95%***	0.004
1	0 to 1	49	-0.38%	0.319	-0.76%*	0.062
1	0 to 2	49	-1.35%***	0.003	-1.79%***	0.002
1	0 to 3	49	-1.84%***	0.000	-2.40%***	0.001
2	-1 to 1	49	-1.87%**	0.036	-1.89%**	0.038
2	-1 to 2	49	-2.27%**	0.024	-2.18%**	0.035
2	-1 to 3	49	-2.32%**	0.049	-2.44%*	0.057
2	0 to 1	49	-1.69%***	0.005	-1.56%***	0.009
2	0 to 2	49	-2.09%***	0.005	-1.84%**	0.010
2	0 to 3	49	-2.14%**	0.031	-2.10%**	0.038

Table 2.16: Abnormal returns around adoption of CRD IV (continued)

Panel C: Combined market-adjusted mean abnormal returns (AR) (daily)

Panel C presents *t*-tests on whether combined daily ARs are different from 0. AR is calculated per Equation (9). Event day '0' represents the day of public disclosure of the event. *N* is the number of observations. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

			Local Index				EU Index			
Event	Event day	*N*	AR	*p*-value	# neg AR	% neg AR	AR	*p*-value	# neg AR	% neg AR
1 & 2	-1	98	0.02%	0.951	42	42.9%	0.06%	0.892	47	48.0%
1 & 2	0	98	-0.68%*	0.055	62	63.3%	-0.76%**	0.041	61	62.2%
1 & 2	1	98	-0.35%	0.103	59	60.2%	-0.40%	0.103	58	59.2%
1 & 2	2	98	-0.68%***	0.002	60	61.2%	-0.66%***	0.008	54	55.1%
1 & 2	3	98	-0.27%	0.330	56	57.1%	-0.43%	0.161	54	55.1%

Panel D: Significance tests on combined market-adjusted cumulative abnormal returns (CAR)

Panel D presents *t*-tests of combined CARs being different from 0. CAR is calculated per Equation (10). Event window represents the days around the day of public disclosure of the event. *N* is the number of observations. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

			Local Index		EU Index	
Event	Event window	*N*	CAR	*p*-value	CAR	*p*-value
1 & 2	-1 to 1	98	-1.01%*	0.064	-1.10%**	0.045
1 & 2	-1 to 2	98	-1.69%***	0.004	-1.76%***	0.004
1 & 2	-1 to 3	98	-1.97%***	0.003	-2.19%***	0.002
1 & 2	0 to 1	98	-1.04%***	0.004	-1.16%***	0.001
1 & 2	0 to 2	98	-1.72%***	0.000	-1.82%***	0.000
1 & 2	0 to 3	98	-1.99%**	0.000	-2.25%***	0.000

Table 2.17: Abnormal returns around press articles on CBCR

Panel A: Market-adjusted mean abnormal returns (AR) (daily)

Panel A presents *t*-tests on whether daily ARs are different from 0. AR is calculated per Equation (9). Event day '0' represents the day of public disclosure of the event. *N* is the number of observations. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

		Local Index				EU Index			
Event day	*N*	AR	*p*-value	# neg AR	% neg AR	AR	*p*-value	# neg AR	% neg AR
-1	22	-0.17%	0.442	15	68.2%	-0.22%	0.912	13	59.1%
0	22	-0.39%**	0.046	13	59.1%	-0.40%**	0.047	12	54.5%
1	22	0.75%**	0.018	6	27.3%	0.78%**	0.022	6	27.3%
2	22	-0.26%	0.211	15	68.2%	-0.31%	0.173	15	68.2%

Panel B: Significance tests on market-adjusted cumulative abnormal returns (CAR)

Panel B presents *t*-tests of CARs being different from 0. CAR is calculated per Equation (10). Event window represents the days around the day of public disclosure of the event. *N* is the number of observations. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

		Local Index		EU Index	
Event window	*N*	CAR	*p*-value	CAR	*p*-value
-1 to 1	22	0.18%	0.686	0.35%	0.475
-1 to 2	22	-0.07%	0.859	0.04%	0.922
0 to 1	22	0.36%	0.348	0.38%	0.390
0 to 2	22	0.10%	0.777	0.07%	0.866

2.10 Appendix A: Example CBCR

The CBCR presented below is taken from the 2016 Annual Report of Groupe BPCE.

Note 17 Locations by country

17.1 NET BANKING INCOME AND HEADCOUNT BY COUNTRY

	Net banking income *in millions of euros*	Profit or loss before tax *in millions of euros*[1]	Income tax *in millions of euros*[2]	FTE headcount[3] 12/31/2016
	Fiscal year 2016			
European Union member states				
Germany	172	15	(4)	830
Austria	23	7	(2)	105
Belgium	15	8	(1)	54
Bulgaria	1	1	ns	10
Denmark	12	2	ns	75
Spain	106	5	2	296
France	19,700	5,583	(1,370)	91,075
Great Britain	389	191	(122)	643
Hungary	1	ns	ns	28
Ireland	ns	(2)	(1)	7
Italy	178	102	(37)	292
Latvia	ns	ns	ns	6
Lithuania	2	1	ns	14
Luxembourg	109	60	(6)	186
Netherlands	14	2	ns	72
Poland	23	9	(2)	230
Portugal	29	13	(4)	146
Czech Republic	1	ns	ns	8
Romania	8	2	ns	80
Slovakia	ns	(1)	ns	9
Sweden	2	(1)	ns	14
Rest of Europe				
Jersey	ns	ns	0	0
Monaco	12	3	(1)	43
Russia	14	7	(1)	66
Switzerland	34	(12)	4	105
Africa and Mediterranean				
South Africa	5	1	ns	58
Algeria	54	11	(3)	745
Cameroon	87	20	(5)	752
Congo	22	4	(2)	197
Djibouti	24	2	ns	256
United Arab Emirates	29	17	0	54
Mauritius	16	4	ns	288
Israel	11	ns	ns	102
Madagascar	33	19	(4)	412
Morocco	2	ns	ns	3
Tunisia	27	(25)	8	493
Turkey	6	ns	ns	56

	Net banking income *in millions of euros*	Profit or loss before tax *in millions of euros*[1]	Income tax *in millions of euros*[2]	FTE headcount[3] 12/31/2016
	Fiscal year 2016			
North & South America				
Argentina	8	3	(1)	45
Brazil	9	3	(1)	83
Canada	11	ns	2	49
Chile	6	1	ns	45
Ecuador	2	ns	ns	24
United States	2,496	797	(299)	2,598
Cayman Islands	3	3	0	0
Mexico	3	(3)	2	58
Uruguay	ns	ns	0	1
Asia/Oceania				
Australia	18	5	(2)	34
Cambodia	0	(1)	0	59
China	9	(14)	3	67
Fiji	6	ns	0	130
Hong Kong	190	72	(11)	342
South Korea	ns	(1)	0	2
Japan	43	(1)	(1)	131
Laos	8	1	ns	175
Malaysia	1	1	ns	5
New Caledonia	73	26	(12)	381
French Polynesia	54	16	(6)	290
Singapore	40	(4)	(5)	187
Taiwan	2	(1)	ns	28
Thailand	1	ns	0	97
Vanuatu	12	4	0	128
Vietnam	2	ns	0	58
GROUP TOTAL	**24,158**	**6,955**	**(1,882)**	**102,827**

(1) Profit or loss before income tax and before taxes other than on income recognized as operating income.
(2) Tax payable and deferred tax, excluding taxes other than on income recognized as operating income.
(3) Number of FTE employees working at the reporting date.
ns: non significant

17.2 ENTITY LOCATIONS BY COUNTRY

Country of location	Business
SOUTH AFRICA	
COFACE SOUTH AFRICA	Insurance
COFACE SOUTH AFRICA SERVICES	Insurance
ALGERIA	
NATIXIS ALGÉRIE	Bank
GERMANY	
3F HOLDING	Holding company
AEW EUROPE GERMAN BRANCH	Distribution
COFACE DEBITOREN	Credit information and debt recovery
COFACE DEUTSCHLAND	Credit insurance and related services
COFACE FINANZ	Factoring
COFACERATING HOLDING	Credit information and debt recovery
COFACERATING.DE	Credit information and debt recovery
FIDOR BANK AG	Online bank
FIDOR SOLUTION AG	IT services
KISSELBERG	Insurance
NATIXIS FRANCFORT	Finance company
NATIXIS GLOBAL ASSOCIATES GERMANY	Distribution
NATIXIS PFANDBRIEFBANK AG	Credit institution
NGAM SA ZWEIGNIERDERLAASUNG DEUTSCHLAND	Distribution
ARGENTINA	
COFACE ARGENTINA (COFACE SA BRANCH)	Credit insurance and related services
AUSTRALIA	
COFACE ARGENTINA (COFACE SA BRANCH)	Credit insurance and related services
NATIXIS AUSTRALIA PTY LTD	Finance company
NATIXIS GLOBAL ASSOCIATES AUSTRALIA HOLDINGS, LLC	Holding company
NGAM AUSTRALIE	Distribution
AUSTRIA	
COFACE AUSTRIA	Holding company
COFACE CENTRAL EUROPE HOLDING	Holding company
COFACE SERVICES AUSTRIA	Credit information and debt recovery
BELGIUM	
COFACE BELGIUM (COFACE SA BRANCH)	Credit insurance and related services
COFACE BELGIUM SERVICES HOLDING	Commercial and solvency information
EPBF	Payment institution
IRR INVEST	Private equity
NATIXIS BELGIQUE INVESTISSEMENTS	Investment company
NJR INVEST	Private equity
BRAZIL	
COFACE DO BRASIL SEGUROS DE CREDITO	Credit insurance and related services
NATIXIS BRASIL SA	Finance company
SEGURO BRASILEIRA CE	Credit insurance and related services

Country of location	Business
BULGARIA	
COFACE BULGARIA (BRANCH)	Insurance
CAMBODIA	
BRED BANK CAMBODIA PLC	Finance company
CAMEROON	
BICEC	Bank
CANADA	
COFACE CANADA (COFACE SA BRANCH)	Credit insurance and related services
NATIXIS CANADA	Finance company
NGAM CANADA FINANCIAL CORPORATION	Asset management
NGAM CANADA FINANCIAL LIMITED PARTNERSHIP	Asset management
NGAM CANADA INVESTMENT CORPORATION	Asset management
NGAM CANADA LIMITED	Asset management
TREZ COMMERCIAL FINANCES LP	Real Estate Financing
CHILE	
COFACE CHILE S.A	Insurance
COFACE CHILE (COFACE EUROPE BRANCH)	Credit insurance and related services
CHINA	
BRD CHINA LTD	Private equity
NATIXIS BEIJING	Finance company
NATIXIS SHANGHAI	Finance company
CONGO	
BCI BQ COMMERCIALE INTERNATIONALE	Bank
SOUTH KOREA	
NGAM KOREA	Distribution
DENMARK	
COFACE DANMARK (COFACE KREDIT BRANCH)	Insurance
MIDT FACTORING A/S	Factoring
DJIBOUTI	
BCI MER ROUGE	Bank
UNITED ARAB EMIRATES	
NATIXIS DUBAI	Finance company
NGAM MIDDLE EAST	Distribution
ECUADOR	
COFACE ECUADOR (COFACE EUROPE BRANCH)	Credit insurance and related services
SPAIN	
COFACE IBERICA (COFACE EUROPE BRANCH)	Credit insurance and related services
COFACE SERVICIOS ESPANA SL	Credit information and debt recovery
NATIXIS CAPITAL PARTNERS SPAIN	Mergers & acquisitions consulting
NATIXIS LEASE MADRID	Real estate and non-real estate leasing
NATIXIS MADRID	Finance company
NGAM SUCURSAL EN ESPANA	Distribution

Country of location	Business
UNITED STATES	
AEW CAPITAL MANAGEMENT, INC.	Asset management
AEW CAPITAL MANAGEMENT, LP	Asset management
AEW PARTNERS III, INC.	Asset management
AEW PARTNERS IV, INC.	Asset management
AEW PARTNERS V, INC.	Asset management
AEW PARTNERS VI, INC.	Asset management
AEW PARTNERS VII, INC.	Asset management
AEW REAL ESTATE ADVISORS, INC.	Asset management
AEW SENIOR HOUSING INVESTORS INC.	Asset management
AEW VALUE INVESTORS ASIA II GP LIMITED	Asset management
AEW VIA INVESTORS, LTD	Asset management
AEW VIF INVESTORS II, INC.	Asset management
AEW VIF INVESTORS, INC.	Asset management
ALPHASIMPLEX GROUP LLC	Asset management
ALTERNATIVE STRATEGIES GROUP LLC	Asset management
AURORA INVESTMENT MANAGEMENT LLC	Asset management
BLEACHERS FINANCE	Securitization vehicle
CASPIAN CAPITAL MANAGEMENT, LLC	Asset management
CM REO HOLDINGS TRUST	Secondary market financing
CM REO TRUST	Secondary market financing
COFACE NORTH AMERICA	Credit insurance and related services
COFACE NORTH AMERICA HOLDING COMPANY	Holding company
COFACE NORTH AMERICA INSURANCE COMPANY	Credit insurance and related services
COFACE SERVICES NORTH AMERICA GROUP	Holding company
CREA WESTERN INVESTORS I, INC.	Asset management
EPI SLP LLC	Asset management
EPI SO SLP LLC	Asset management
GATEWAY INVESTMENT ADVISERS, LLC	Asset management
HARRIS ALTERNATIVES HOLDING INC	Holding company
HARRIS ASSOCIATES LP	Asset management
HARRIS ASSOCIATES SECURITIES, LP	Distribution
HARRIS ASSOCIATES, INC.	Asset management
LOOMIS SAYLES & COMPANY, INC.	Asset management
LOOMIS SAYLES & COMPANY, LP	Asset management
LOOMIS SAYLES ALPHA, LLC.	Asset management
LOOMIS SAYLES DISTRIBUTORS, INC.	Distribution
LOOMIS SAYLES DISTRIBUTORS, LP	Distribution
LOOMIS SAYLES SOLUTIONS, LLC	Asset management
LOOMIS SAYLES TRUST COMPANY, LLC	Asset management
MC DONNELL	Asset management
MSR TRUST	Real Estate Financing
NAM US	Asset management
NATIXIS ASG HOLDINGS, INC	Distribution
NATIXIS CASPIAN PRIVATE EQUITY LLC	Asset management

Country of location	Business
NATIXIS FINANCIAL PRODUCTS LLC	Derivative transactions
NATIXIS FUNDING CORP	Other finance company
NATIXIS GLOBAL ASSET MANAGEMENT HOLDINGS, LLC	Holding company
NATIXIS GLOBAL ASSET MANAGEMENT, LLC	Holding company
NATIXIS GLOBAL ASSET MANAGEMENT, LP	Holding company
NATIXIS INVESTMENT CORP.	Portfolio management
NATIXIS NEW YORK	Finance company
NATIXIS NORTH AMERICA LLC	Holding company
NATIXIS PRIVATE EQUITY CASPIAN IA, LP	Private equity
NATIXIS PRIVATE EQUITY CASPIAN IB, LP	Private equity
NATIXIS REAL ESTATE CAPITAL LLC	Real Estate Financing
NATIXIS REAL ESTATE HOLDINGS LLC	Real Estate Financing
NATIXIS SECURITIES AMERICAS LLC	Trading firm
NATIXIS US HOLDINGS INC	Holding company
NATIXIS US MTN PROGRAM LLC	Issuing vehicle
NGAM ADVISORS, LP	Distribution
NGAM DISTRIBUTION CORPORATION	Distribution
NGAM DISTRIBUTION, LP	Distribution
NGAM INTERNATIONAL, LLC	Distribution
NH PHILADELPHIA PROPERTY LP	Real Estate Financing
PETER J. SOLOMON COMPANY LP	Mergers & acquisitions consulting
PETER J. SOLOMON SECURITIES COMPANY LLC	Brokerage
VAUGHAN NELSON INVESTMENT MANAGEMENT, INC.	Asset management
VAUGHAN NELSON INVESTMENT MANAGEMENT, LP	Asset management
VERSAILLES	Securitization vehicle
FIJI	
BRED BANK FIJI LTD	Bank
FRANCE	
1818 IMMOBILIER	Office space
228 SOCIÉTÉS LOCALES D'EPARGNE	Cooperative shareholder
339 ETATS-UNIS	Office space
45 MUTUAL GUARANTEE COMPANIES	Guarantee company
AAA ACTIONS AGROALIMENTAIRE	Insurance UCITS
ABP ALTERNATIF OFFENSIF	Alternative fund of funds
ABP VIE MANDAT FPCI	Risk Capital Fund
AEW COINVEST	Asset management
AEW EUROPE SA	Asset management
AEW EUROPE SGP	Asset management
ADOUR SERVICES COMMUNS	Office space
AFOPEA	Office space
ALBIANT IT	IT systems and software consulting
ALLIANCE ENTREPRENDRE	Asset management
APOUTICAYRE LOGEMENTS	Office space

Country of location	Business
ARIES ASSURANCES	Insurance brokerage
ATLANTIQUE PLUS	Holding company
AUSSONNELLE DE C	Office space
AXELTIS SA	Holding company
BANQUE BCP S.A.S	Bank
BANQUE DE SAVOIE	Bank
BANQUE DUPUY, DE PARSEVAL	Bank
BANQUE MARZE	Bank
BANQUE PALATINE	Bank
BANQUE POPULAIRE ALSACE LORRAINE CHAMPAGNE	Bank
BANQUE POPULAIRE AQUITAINE CENTRE ATLANTIQUE	Bank
BANQUE POPULAIRE ATLANTIQUE	Bank
BANQUE POPULAIRE BOURGOGNE FRANCHE-COMTE	Bank
BANQUE POPULAIRE MEDITERRANEE	Bank
BANQUE POPULAIRE DE L'OUEST	Bank
BANQUE POPULAIRE AUVERGNE RHÔNE ALPES	Bank
BANQUE POPULAIRE DU NORD	Bank
BANQUE POPULAIRE DU SUD	Bank
BANQUE POPULAIRE OCCITANE	Bank
BANQUE POPULAIRE RIVES DE PARIS	Bank
BANQUE POPULAIRE VAL DE FRANCE	Bank
BANQUE PRIVEE 1818	Credit institution
BATI LEASE	Real estate leasing
BATI-LEASE INVEST	Office space
BATIMAP	Non-real estate leasing
BATIROC BRETAGNE PAYS DE LOIRE	Real estate and non-real estate leasing
BCEF 64	Office space
BEAULIEU IMMO	Office space
BIC BRED	Bank
BLEU RÉSIDENCE LORMONT	Office space
BORDELONGUE GODEAS	Office space
BP COVERED BONDS	Refinancing
BP DEVELOPPEMENT	Private equity
BPA ATOUTS PARTICIPATIONS	Private equity
BPCE ACHATS	Services company
BPCE APS	Service provider
BPCE ASSURANCES	Insurance company
BPCE IMMOBILIER EXPLOITATION	Real estate investment
BPCE INFOGÉRANCE ET TECHNOLOGIE	IT services
BPCE INTERNATIONAL	Specialized credit institution
BPCE MASTER HOME LOANS DEMUT/ BPCE CONSUMER LOANS DEMUT	French securitization fund (FCT)
BPCE MASTER HOME LOANS FCT/ BPCE CONSUMER LOANS FCT	French securitization fund (FCT)
BPCE PRÉVOYANCE (formerly ABP PREVOYANCE)	Provident insurance
BPCE RELATION ASSURANCES	Services company

Country of location	Business
BPCE SA	Holding company
BPCE SERVICES FINANCIERS (formerly CSF-GCE)	Services company
BPCE SFH	Refinancing
BPCE VIE (formerly ABP VIE)	Insurance
BRED – BANQUE POPULAIRE	Bank
BRED COFILEASE	Non-real estate leasing
BRED GESTION	Bank
BTP BANQUE	Bank
BTP CAPITAL CONSEIL	Financial investment advisory services
BTP CAPITAL INVESTISSEMENT	Private equity
BUREAU DU MANAGEMENT FINANCIER	Finance company
BURODIN	Office space
CAISSE D'EPARGNE ALSACE	Bank
CAISSE D'EPARGNE AQUITAINE POITOU-CHARENTES	Bank
CAISSE D'EPARGNE BRETAGNE PAYS DE LOIRE	Bank
CAISSE D'EPARGNE CÔTE D'AZUR	Bank
CAISSE D'EPARGNE D'AUVERGNE ET DU LIMOUSIN	Bank
CAISSE D'EPARGNE DE BOURGOGNE FRANCHE-COMTÉ	Bank
CAISSE D'EPARGNE DE MIDI-PYRÉNÉES	Bank
CAISSE D'EPARGNE ILE-DE-FRANCE	Bank
CAISSE D'EPARGNE LANGUEDOC-ROUSSILLON	Bank
CAISSE D'EPARGNE LOIRE CENTRE	Bank
CAISSE D'EPARGNE LOIRE DRÔME ARDÈCHE	Bank
CAISSE D'EPARGNE LORRAINE CHAMPAGNE ARDENNE	Bank
CAISSE D'EPARGNE NORD FRANCE EUROPE	Bank
CAISSE D'EPARGNE NORMANDIE	Bank
CAISSE D'EPARGNE PICARDIE	Bank
CAISSE D'EPARGNE PROVENCE-ALPES-CORSE	Bank
CAISSE D'EPARGNE RHONE ALPES	Bank
CAISSE RÉGIONALE CREDIT MARITIME ATLANTIQUE	Bank
CAISSE RÉGIONALE CREDIT MARITIME BRETAGNE NORMANDIE	Bank
CAISSE RÉGIONALE CRÉDIT MARITIME DE MEDITERRANEE	Bank
CAISSE RÉGIONALE CREDIT MARITIME REGION NORD	Bank
CAISSE RÉGIONALE CREDIT MARITIME SUD OUEST	Bank
CAISSE SOLIDAIRE	Finance company
CAPI COURT TERME N°1	Private equity
CAPITOLE FINANCE	Non-real estate leasing
CASDEN – BANQUE POPULAIRE	Bank

Country of location	Business
CE HOLDING PARTICIPATIONS	Holding company
CEBIM	Holding company
CEPAIM SA	Office space
CFG COMPTOIR FINANCIER DE GARANTIE	Guarantee company
CICOBAIL	Real estate leasing
CILOGER	Property management
CLICK AND TRUST	Data processing
CO-ASSUR	Insurance brokerage advisory services
COFACE EUROPE	Credit insurance and related services
COFACE SA	Holding company
COFEG	Consulting
COFIMAB	Real estate agent
COFINPAR	Credit insurance and related services
COGERI	Credit information and debt recovery
COMPAGNIE DE FINANCEMENT FONCIER	Finance company
COMPAGNIE EUROPEENNE DE GARANTIES ET CAUTIONS	Insurance
CONTANGO TRADING SA	Brokerage firm
CRÉDIT COOPERATIF	Bank
CRÉDIT FONCIER DE FRANCE	Bank
CRÉDIT FONCIER EXPERTISE	Real estate valuation
CRÉDIT FONCIER IMMOBILIER	Office space
CREPONORD	Real estate and non-real estate leasing
CRISTAL IMMO	Office space
DARIUS CAPITAL PARTNERS SAS	Financial investment advisory services
DELESSERT FCP 2DEC REGPT	BPCE Guarantee and Solidarity fund
DNCA COURTAGE	Asset management
DNCA FINANCE	Asset management
DNCA MANAGEMENT	Asset management
DORVAL FINANCE	Asset Management
ECOFI INVESTISSEMENT	Portfolio management
ELLISPHÈRE	Information
ESFIN GESTION	Portfolio management
ESNI	Securitization company
EURO CAPITAL	Private equity
EURO PRIVATE EQUITY FRANCE (formerly DAHLIA PARTNERS)	Asset management
EUROTERTIA	Office space
EXPANSINVEST	Private equity
EXPANSO INVESTISSEMENTS	Private equity
FCC ELIDE	French securitization fund (FCT)
FCPR FIDEPPP	Public-private partnership financing
FCT ERIDAN	French securitization fund (FCT)
FCT LIQUIDITE SHORT 1	Securitization vehicle
FCT NATIXIS EXPORT CREDIT AGENCY	Securitization vehicle

Country of location	Business
FCT PUMACC	Consumer credit securitization vehicle
FCT VEGA	French securitization fund (FCT)
FERIA PAULMY	Office space
FILIALES LOCI	Real estate and non-real estate leasing
FIMIPAR	Accounts receivable purchasing
FINANCIÈRE DE LA BP OCCITANE	Holding company
FINANCIÈRE PARTICIPATION BPS	Holding company
FIPROMER	Brokerage and investment services
FONCIER PARTICIPATIONS	Holding company
FONCIÈRE D'ÉVREUX	Office space
FONCIÈRE INVEST	Office space
FONCIÈRE KUPKA	Office space
FONCIÈRE VICTOR HUGO	Holding company
FONDS COLOMBES	UCITS
FRUCTIFONCIER	Insurance real estate investments
FRUCTIFONDS PROFIL 6	Insurance UCITS
FRUCTIFONDS PROFIL 9	Insurance UCITS
G IMMO	Office space
G102	Office space
GARIBALDI CAPITAL DEVELOPPEMENT	Holding company
GCE CAPITAL	Private equity
GCE COINVEST	Holding company
GCE PARTICIPATIONS	Holding company
GIE CE SYNDICATION RISQUES	Guarantee company
GRAMAT BALARD	Office space
GROUPEMENT DE FAIT	Services company
HABITAT EN RÉGION SERVICES	Holding company
HOLASSURE	Holding company
IBP INVESTISSEMENT	Office space
IMMOCEAL	Real estate investment
IMMO SPORT	Office space
IMMOCARSO SNC	Real estate investment
INCITY	Office space
INFORMATIQUE BANQUES POPULAIRES	IT services
INGÉNIERIE ET DÉVELOPPEMENT	Holding company
INGEPAR	Financial investment advisory services
INTERCOOP	Real estate leasing
IT-CE	IT services
LABEGE LAKE H1	Office space
LAKOOZ	IT programming
LANGLADE SERVICES	Office space
LANTA PRODUCTION	Office space
LEASE EXPANSION	Operational IT leasing
LEVISEO	Office space

Country of location	Business
LOCINDUS	Real estate and non-real estate leasing
MIDI COMMERCES	Office space
MIDI FONCIÈRE	Office space
MIDI MIXT	Office space
MIDI PYRENEES PLACEMENT	Mutual fund
MIFCOS	Real estate investment
MIROVA ENVIRONMENT AND INFRASTRUCTURE	Venture capital fund management
MONTAUDRAN PLS	Office space
MULTICROISSANCE SAS	Portfolio management
MURACEF	Mutual insurance
MURET ACTIVITES	Office space
NALEA	Securitization vehicle
NAMI AEW EUROPE	Asset management
NAMI INVESTMENT	Insurance real estate investments
NATIXIS ALTAIR IT SHARED SERVICES	IT services
NATIXIS ASSET MANAGEMENT	Asset management
NATIXIS ASSET MANAGEMENT FINANCE	Holding company
NATIXIS ASSURANCES	Insurance companies holding company
NATIXIS BAIL	Real estate leasing
NATIXIS CAR LEASE	Long-term vehicle leasing
NATIXIS COFICINE	Finance company (audio-visual)
NATIXIS CONSUMER FINANCE	Holding company
NATIXIS CONSUMER FINANCE IT	Consumer Credit
NATIXIS ENERGECO	Non-real estate leasing
NATIXIS FACTOR	Factoring
NATIXIS FINANCEMENT	Consumer Credit
NATIXIS FONCIÈRE SA (formerly SPAFICA)	Real estate investment
NATIXIS FORMATION ÉPARGNE FINANCIÈRE	Holding company
NATIXIS FUNDING	Secondary debt market services
NATIXIS GLOBAL ASSET MANAGEMENT	Holding company
NATIXIS GLOBAL ASSET MANAGEMENT PARTICIPATIONS 1	Holding company
NATIXIS GLOBAL ASSET MANAGEMENT PARTICIPATIONS 3	Holding company
NATIXIS HCP	Holding company
NATIXIS IMMO DEVELOPPEMENT	Housing real estate development
NATIXIS IMMO EXPLOITATION	Office space
NATIXIS INNOV	Holding company
NATIXIS INTEREPARGNE	Employee savings account management
NATIXIS INTERTITRES	Service vouchers
NATIXIS LEASE	Non-real estate leasing
NATIXIS LEASE IMMO	Real estate leasing
NATIXIS LIFE	Life insurance

Country of location	Business
NATIXIS LLD	Long-term vehicle leasing
NATIXIS MARCO	Investment company – (extension of activity)
NATIXIS PARTNERS	Bank
NATIXIS PAYMENT SOLUTIONS	Banking services
NATIXIS PRAMEX INTERNATIONAL	International development and consulting services
NATIXIS PRIVATE EQUITY	Private equity
NATIXIS SA	Credit institution
NATIXIS ULTRA SHORT TERM BONDS PLUS	Insurance UCITS
NAXICAP PARTNERS	Venture capital fund management
NAXICAP RENDEMENT 2018	Private equity
NAXICAP RENDEMENT 2022	Private equity
NGAM DISTRIBUTION, FRENCH BRANCH	Distribution
NORDRI	Securitization vehicle
NOVA IMMO	Office space
OCEOR LEASE REUNION	Non-real estate leasing
OCEORANE	Financial investment advisory services
OPCI FRANCEUROPE IMMO	Insurance UCITS
OPCI NATIXIS LEASE INVESTMENT	Real estate fund
OSSIAM	Asset management
OUEST CROISSANCE SCR	Private equity
OXIANE	Real estate and non-real estate leasing
PALATINE ASSET MANAGEMENT	Asset management
PARNASSE FINANCES	Portfolio management
PARTICIPATIONS BP ACA	Holding company
PERSPECTIVES ENTREPRISES	Holding company
PERSPECTIVES ET PARTICIPATIONS	Private equity
PHILAE SAS	Office space
PLUSEXPANSION	Holding company
PREPAR COURTAGE	Insurance brokerage
PREPAR-IARD	Non-life insurance
PREPAR-VIE	Life insurance and endowment
PROMEPAR GESTION	Portfolio management
RANGUEIL CORMIERS	Office space
REAUMUR ACTIONS (FORMERLY ABP DIVERSIFIE)	Insurance UCITS
RIOU	Office space
RIVES CROISSANCE	Holding company
ROISSY COLONNADIA	Office space
Property investment partnership ALTAIR 1	Office space
Property investment partnership ALTAIR 2	Office space
SAS ALPES DEVELOPPEMENT DURABLE INVESTISSEMENT	Private equity
SAS FINANCIÈRE IMMOBILIÈRE 15	Housing real estate development
SAS FONCIÈRE DES CAISSES D'EPARGNE	Real estate investment

Country of location	Business
SAS FONCIÈRE ECUREUIL II	Real estate investment
SAS IMMOBILIÈRE NATIXIS BAIL	Real estate leasing
SAS TASTA	Services company
SASU BFC CROISSANCE	Private equity
SAVOISIENNE	Holding company
SBE	Bank
SCA ECUFONCIER	Finance company
SCI BPSO	Office space
SCI BPSO 11 MORLAAS	Office space
SCI BPSO BASTIDE	Office space
SCI BPSO CAMBO	Office space
SCI BPSO CONDE SOUVENIR	Office space
SCI BPSO GUJAN	Office space
SCI BPSO LE BOUSCAT	Office space
SCI BPSO LE HAILLAN	Office space
SCI BPSO LESPARRE	Office space
SCI BPSO LIBOURNE EST	Office space
SCI BPSO MARNE	Office space
SCI BPSO MERIGNAC 4 CHEMINS	Office space
SCI BPSO PESSAC	Office space
SCI BPSO PESSAC CENTRE	Office space
SCI BPSO ST AMAND	Office space
SCI BPSO ST ANDRÉ	Office space
SCI BPSO ST ESPRIT	Office space
SCI BPSO ST PAUL	Office space
SCI BPSO TALENCE	Office space
SCI CHAMPS-ÉLYSÉES	Property management
SCI CREDIMAR	Office space
SCI DANS LA VILLE	Office space
SCI DU CREDIT COOPÉRATIF DE SAINT-DENIS	Office space
SCI FAIDHERBE	Office space
SCI FONCIÈRE 1	Real estate investment
SCI GARIBALDI OFFICE	Office space
SCI LA BOÉTIE	Property management
SCI LAFAYETTE BUREAUX	Office space
SCI LE CIEL	Office space
SCI LE RELAIS	Office space
SCI POLARIS	Office space
SCI PYTHEAS PRADO 1	Office space
SCI PYTHEAS PRADO 2	Office space
SCI SACCEF	Property management
SCI SAINT-DENIS	Office space
SCI TOURNON	Office space
SCPI FRUCTIFONDS IMMOBILIER	Insurance real estate investments
SCRIBE BAIL LOGIS SAS	Real estate and non-real estate leasing
SCRIBEURO SAS	Real estate and non-real estate leasing
SEGIMLOR	Office space

Country of location	Business
SELECTION 1818	Distribution of financial products for IWMAs
SEREXIM	Real estate valuation
SEVENTURE PARTNERS	Asset management
SI EQUINOXE	Holding company
SIMC	Holding company
SIPMEA	Real estate development/ management, real estate investment
SMI	Portfolio management
S-MONEY	Electronic payments
SNC ECUREUIL 5 RUE MASSERAN	Real estate investment
SOCFIM	Bank
SOCFIM PARTICIPATIONS IMMOBILIÈRES	Holding company
SOCIÉTARIAT BP DES ALPES	Cooperative shareholder
SOCIÉTARIAT BP DU MASSIF CENTRAL	Cooperative shareholder
SOCIÉTARIAT BP DU NORD	Cooperative shareholder
SOCIÉTÉ CENTRALE DU CREDIT MARITIME MUTUEL	Services company
SOCIÉTÉ D'EXPANSION BOURGOGNE FRANCHE-COMTÉ	Holding company
SOCIÉTÉ D'INVESTISSEMENT ET DE PARTICIPATION IMMOBILIÈRE (SIPARI)	Holding company
SOCIÉTÉ IMMOBILIÈRE PROVENÇALE ET CORSE	Holding company
SOFIAG	Finance company
SOFIDER	Finance company
SOPASSURE	Holding company
SPG	Open-ended investment company
SPGRES	Holding company
SPIG	Property leasing
SPPICAV AEW FONCIÈRE ECUREUIL	Office space
SUD OUEST BAIL	Real estate leasing
TECHNOCITE TERTIA	Office space
TETRIS	Office space
TRANSIMMO	Real estate agent
UNION DES SOCIÉTÉS DU CRÉDIT COOPÉRATIF (GIE)	Services company
VAUBAN MOBILISATIONS GARANTIES (VMG)	Finance company
VEGA INVESTMENT MANAGERS	UCITS management company
VENDÔME INVESTISSEMENTS	Holding company
VIALINK	Data processing
VIVALIS INVESTISSEMENTS	Office space
GREAT BRITAIN	
AEW EUROPE ADVISORY LTD	Asset management
AEW EUROPE CC LTD	Asset management
AEW EUROPE HOLDING LTD	Asset management
AEW EUROPE INVESTMENT LTD	Asset management
AEW EUROPE LLP	Asset management
AEW EUROPE PARTNERSHIP	Asset management
AEW GLOBAL ADVISORS (EUROPE) LTD	Asset management

Country of location	Business
AEW GLOBAL LTD	Asset management
AEW GLOBAL UK LTD	Asset management
COFACE UK (COFACE EUROPE BRANCH)	Credit insurance and related services
COFACE UK HOLDING	Holding company
COFACE UK SERVICES LTD	Credit information and debt recovery
H2O ASSET MANAGEMENT CORPORATE MEMBER	Asset management
H2O ASSET MANAGEMENT LLP	Asset management
LOOMIS SAYLES INVESTMENTS LTD (UK)	Asset management
NATIXIS LONDRES	Finance company
NGAM UK LTD	Distribution
HONG KONG	
AEW ASIA LIMITED	Asset management
COFACE HONG KONG (COFACE EUROPE BRANCH)	Credit insurance and related services
NATIXIS ASIA LTD	Other finance company
NATIXIS GLOBAL ASSET MANAGEMENT HONG KONG	Asset management
NATIXIS HONG KONG	Finance company
HUNGARY	
COFACE HUNGARY – (COFACE AUSTRIA)	Insurance
MAURITIUS	
BANQUE DES MASCAREIGNES	Bank
CAYMAN ISLANDS	
DF EFG3 LIMITED	Holding company
NATIXIS NEW YORK BRANCH	Finance company
IRELAND	
COFACE IRELAND (COFACE EUROPE BRANCH)	Credit insurance and related services
NATINIUM FINANCIAL PRODUCTS	Securitization vehicle
NATIXIS CORPORATE SOLUTIONS LTD	Structured finance
NEXGEN CAPITAL LTD	Structured finance
NEXGEN FINANCIAL HOLDINGS LTD	Holding company
NEXGEN REINSURANCE LTD	Reinsurance
ISRAEL	
BUSINESS DATA INFORMATION	Marketing and other services
COFACE HOLDING ISRAEL	Holding company
COFACE ISRAEL	Credit insurance
ITALY	
AEW EUROPE ITALIAN BRANCH	Distribution
COFACE ASSICURAZIONI SPA	Credit insurance and related services
COFACE ITALIA	Holding company
NATIXIS LEASE MILAN	Real estate and non-real estate leasing
NATIXIS MILAN	Finance company
NGAM SA BRANCH ITALIANA	Distribution
JAPAN	
COFACE JAPAN (COFACE EUROPE BRANCH)	Credit insurance and related services
NATIXIS ASSET MANAGEMENT JAPAN CO., LTD	Asset management

Country of location	Business
NATIXIS JAPAN SECURITIES CO, LTD	Finance company
NATIXIS TOKYO	Finance company
JERSEY	
NATIXIS STRUCTURED PRODUCTS LTD	Issuing vehicle
LAOS	
BANQUE FRANCO LAO	Bank
LATVIA	
COFACE LATVIA INSURANCE (COFACE AUSTRIA)	Insurance
LITHUANIA	
LEID (COFACE AUSTRIA)	Insurance
LUXEMBOURG	
AEW EUROPE SARL (formerly AEW LUXEMBOURG)	Asset management
BCP LUXEMBOURG	Bank
CODEIS	Private equity
COFACE LUXEMBOURG (COFACE EUROPE)	Credit insurance and related services
DAHLIA A SICAR SCA	Private equity
DNCA LUXEMBOURG	Asset management
H2O ASSET MANAGEMENT HOLDING	Asset management
KENNEDY FINANCEMENT LUXEMBOURG	Investment company – asset management
KENNEDY FINANCEMENT LUXEMBOURG 2	Cash management – asset management
LUX EQUIP BAIL	Real estate and non-real estate leasing
NATIXIS ALTERNATIVE ASSETS	Holding company
NATIXIS BANK	Bank
NATIXIS LIFE	Life insurance
NATIXIS LUXEMBOURG INVESTISSEMENTS	Investment company
NATIXIS PRIVATE EQUITY INTERNATIONAL LUXEMBOURG	Private equity holding
NATIXIS REAL ESTATE FEEDER SARL	Investment company
NATIXIS STRUCTURED INSSUANCE	Issuing vehicle
NATIXIS TRUST	Bank
NGAM S.A	Distribution
OSSIAM ETF EM MI	Asset management
SURASSUR	Reinsurance
MADAGASCAR	
BANQUE MALGACHE DE L'OCÉAN INDIEN	Bank
BM MADAGASCAR	Bank
MALAYSIA	
NATIXIS LABUAN	Finance company
MOROCCO	
BPCE MAROC	Real estate development
BPCE MAROC IMMOBILIER	Real estate development
SKY ELITE TOUR S.A.R.L	Real estate development
MEXICO	
COFACE HOLDING AMERICA LATINA	Financial report
COFACE SEGURO DE CREDITO MEXICO	Insurance
NGAM MEXIQUE	Asset Management

Country of location	Business
NEW CALEDONIA	
BANQUE DE NOUVELLE-CALÉDONIE	Bank
OCEOR LEASE NOUMEA	Non-real estate leasing
SOCIÉTÉ HAVRAISE CALÉDONIENNE	Office space
NETHERLANDS	
COFACE NEDERLAND – (COFACE KREDIT BRANCH)	Insurance
COFACE NEDERLAND SERVICES	Credit information and debt recovery
NGAM NEDERLANDS FILIAL	Distribution
NJR FINANCE BV	Financial Services
POLAND	
AEW CENTRAL EUROPE	Asset management
COFACE POLAND (COFACE AUSTRIA BRANCH)	Insurance
COFACE POLAND CMS	Financial report
COFACE POLAND FACTORING	Factoring
TISE	Private equity
FRENCH POLYNESIA	
BANQUE DE TAHITI	Bank
OCEOR LEASE TAHITI	Non-real estate leasing
PORTUGAL	
BANCO PRIMUS	Bank
COFACE PORTUGAL (COFACE EUROPE BRANCH)	Credit insurance and related services
NATIXIS PORTO	Finance company
CZECH REPUBLIC	
AEW CENTRAL EUROPE CZECH	Distribution
COFACE CZECH INSURANCE (COFACE AUSTRIA BRANCH)	Insurance
ROMANIA	
AEW CENTRAL EUROPE ROMANIA	Distribution
COFACE ROMANIA CMS	Insurance
COFACE ROMANIA INSURANCE (COFACE AUSTRIA BRANCH)	Insurance
RUSSIA	
COFACE RUS INSURANCE COMPANY	Credit insurance
NATIXIS MOSCOW	Bank
SINGAPORE	
ABSOLUTE ASIA AM	Asset management
AEW ASIA PTE LTD	Asset management
COFACE SINGAPORE (COFACE EUROPE BRANCH)	Credit insurance and related services
LOOMIS SAYLES INVESTMENTS ASIA PTE LTD	Asset management
NATIXIS GLOBAL ASSET MANAGEMENT ASIA PTE	Asset management
NATIXIS SINGAPOUR	Finance company

Country of location	Business
SLOVAKIA	
COFACE SLOVAKIA INSURANCE (COFACE AUSTRIA BRANCH)	Insurance
SWEDEN	
COFACE SVERIGE (COFACE KREDIT BRANCH)	Insurance
NGAM NORDICS FILIAL	Distribution
SWITZERLAND	
BANQUE DU LEMAN	Bank
BIC BRED (SUISSE) SA	Bank
COFACE RE	Reinsurance
COFACE SWITZERLAND (COFACE SA BRANCH)	Insurance
COFIBRED	Holding company
EURO PRIVATE EQUITY SA	Asset management
FONDS LAUSANNE	UCITS
NGAM SWITZERLAND SARL	Asset management
TAIWAN	
COFACE TAIWAN (COFACE EUROPE BRANCH)	Credit insurance and related services
NATIXIS TAIWAN	Finance company
NGAM SECURITIES INVESTMENT CONSULTING CO. LTD	Asset management
THAILAND	
BRED IT	IT services
TUNISIA	
ARAB INTERNATIONAL LEASE	Real estate and non-real estate leasing
BANQUE TUNISO KOWEITIENNE	Bank
EL ISTIFA	Debt collection
MEDAI SA	Real estate development
SOCIÉTÉ DU CONSEIL ET DE L'INTERMEDIATION FINANCIÈRE	Investment advisory services
TUNIS CENTER	Real estate development
UNIVERS INVEST (SICAR)	Private equity
UNIVERS PARTICIPATIONS (SICAF)	Private equity
TURKEY	
COFACE SIGORTA TURQUIE	Insurance
URUGUAY	
NGAM URUGUAY	Distribution
VANUATU	
BRED VANUATU	Bank
FONCIÈRE DU VANUATU	Real estate investment
VIETNAM	
BPCE INTERNATIONAL HO CHI MINH CITY	Finance company

2.11 Appendix B: List of tax havens

This Appendix lists the tax havens per Dyreng et al. (2015). † denotes jurisdictions considered 'dot' tax havens in robustness tests. The 'Big 12' jurisdictions (populations > 1.6m) not considered to be tax havens in the robustness tests are: Botswana, Costa Rica, Hong Kong, Ireland, Latvia, Lebanon, Liberia, Netherlands, Panama, Singapore, Switzerland and Uruguay.

	Jurisdiction		Jurisdiction		Jurisdiction
1.	Andorra †	19.	Gibraltar †	37.	Montserrat †
2.	Anguilla †	20.	Grenada †	38.	Nauru †
3.	Antigua and Barbuda †	21.	Guernsey †	39.	Netherlands
4.	Aruba †	22.	Hong Kong	40.	Netherlands Antilles †
5.	Bahamas †	23.	Ireland	41.	Niue †
6.	Bahrain †	24.	Isle of Man †	42.	Palau †
7.	Barbados†	25.	Jersey †	43.	Panama
8.	Belize †	26.	Latvia	44.	Samoa †
9.	Bermuda †	27.	Lebanon	45.	San Marino †
10.	Botswana	28.	Liberia	46.	Seychelles †
11.	British Virgin Islands †	29.	Liechtenstein †	47.	Singapore
12.	Brunei †	30.	Luxembourg†	48.	St. Kitts and Nevis †
13.	Cape Verde †	31.	Macao †	49.	St. Lucia †
14.	Cayman Islands †	32.	Maldives †	50.	St. Vincent and Grenadines †
15.	Cooks Islands †	33.	Malta †	51.	Switzerland
16.	Costa Rica	34.	Marshall Islands †	52.	U.S. Virgin Islands †
17.	Cyrus †	35.	Mauritius †	53.	Uruguay
18.	Dominica †	36.	Monaco †	54.	Vanuatu †

2.12 Appendix C: Chronology of events surrounding the adoption of CRD IV

This Appendix outlines the chronology of events surrounding the implementation of the CRD IV requirements for CBCR. Events 1 and 2 are the events used in the market returns analysis in Section 2.6.5.

Event	Date	Details
	2009	EU Commission begins work on the CRD IV package to implement Basel III into EU law
	December 2010	Basel III agreed by the members of the Basel Committee on Banking Supervision. The Committee issues detailed rules of new global regulatory standards on bank capital adequacy and liquidity (known collectively as Basel III).
Event 1	28 February 2013	Political agreement between the European Parliament and European Council for the inclusion of CBCR into CRD IV
	20 June 2013	CRD IV agreed by the European Council
	26 June 2013	Directive 2013/36/EU finalised
Event 2	27 June 2013	Directive 2013/36/EU published in the Official Journal of the European Union
	16 July 2013	European Commission Daily News Press Release - Memo/13/690 notifies that CRD IV enters into force on 17 July 2013
	17 July 2013	CRD IV enters into force
	31 December 2013	Deadline for Member States to transpose CRD IV into domestic law
	1 January 2014	New CBCR requirements apply in part
	1 January 2015	New CBCR requirements apply in full

2.13 Appendix D: Variable definitions

Variable name	Mnemonic	Definition
Cash effective tax rate	CETR	Income tax paid from the cash flow statement in year *t* divided by pre-tax income in year *t*
Book effective tax rate (current)	BETR	Current income tax expense in year *t* divided by pre-tax income in year *t*
Total tax avoidance	TAX_AVOID	Income tax paid from the cash flow statement in year *t* divided by total assets in year *t-1*
Tax haven turnover	THAV_TO	Ratio of turnover disclosed in tax havens to total turnover
Tax haven profits	THAV_PBT	Ratio of profit before tax disclosed in tax havens to total profit before tax
Tax haven entities	THAV_ENT	Ratio of entities (subsidiaries and branches) located in tax havens to total number of entities
Tax haven employees	THAV_EMP	Ratio of employees disclosed in tax havens to total employees
Number of entities disclosed	NUM_ENTS	Total number of entities (subsidiaries and branches) disclosed by the firm
Number of tax haven entities	NUM_TH_ENTS	Total number of tax haven entities (subsidiaries and branches) disclosed by the firm
Treatment and control firms	EU_BANK	Dummy variable taking the value of 1 if a firm is an EU bank, and 0 if an EU insurer
Period after implementation of CBCR requirements	POST	Dummy variable for the period after the implementation of CBCR requirements; equals 1 for fiscal years after 2013, and 0 otherwise
Period after implementation of CBCR requirements (Robustness tests)	POST_2012	Dummy variable; equals 1 for fiscal years after 2012, and 0 otherwise
Period after full implementation of CBCR requirements	POST_2014	Dummy variable for the period after the full implementation of CBCR requirements; equals 1 for fiscal years after 2014, and 0 otherwise
Firm size	SIZE	The natural logarithm of total assets after conversion to Euros
Profitability	ROA	Pre-tax income scaled by total assets
Leverage	LEV	Total liabilities scaled by total assets
Intangible assets	INTANG	Net intangible assets scaled by total assets

Variable name	Mnemonic	Definition
Capital intensity	CAPINT	Net property, plant and equipment scaled by total assets
Revenue growth	REV_GRTH	Change in total revenues from year *t*-1 to year *t* scaled by total revenues in year *t*-1
Change in tax losses carried forward	ΔTLCF	Change in the tax loss carried forward from year *t*-1 to year *t* scaled by total assets
Tax losses carried forward	TLCF_DUM	Dummy variable for tax losses carried forward; equals 1 if the tax loss carried forward is positive as at the beginning of the year, and 0 otherwise
Tax rate	TAX_RATE	Statutory corporate tax rate prevailing in year *t* for the firm's residence country (includes central government corporate income tax rate and the average effects of sub-central government income tax rates)
Tax enforcement	TAX_ENF	Annual tax evasion scores on a scale from 0 to 10 with higher scores indicating lower tax evasion (higher perceived enforcement)
Abnormal return	AR	Return minus market return
Cumulative abnormal return	CAR	Summation of AR over the event period
Return	Return	Share price (cum div), *P*, of firm *i* at time *t* minus the share price of firm *i* at time *t*-1 as follows: $Return_{i,j,t} = [\frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}]$ Where *j* is the country of primary listing
Market return	Market return	Value of the major equity index (including dividends), *X*, of country *j*, in which firm *i* is listed at time *t* minus the value of *X* at time *t*-1 as follows: $Market\ Return = [\frac{X_{i,t} - X_{i,t-1}}{X_{i,t-1}}]$

Chapter 3

The interplay between mandatory public country-by-country tax disclosures, geographic segment reporting, and tax havens: Evidence from the European Union

3.1 Introduction

We exploit an exogenous shock effective in 2013 where a new requirement included in the EU Capital Requirements Directive IV (CRD IV), requires EU credit institutions and investment firms to annually publish tax-related financial information on a country-by-country basis.[1] Country-by-country reporting (CBCR) stipulates the *public* disclosure of turnover, profits, taxes, employee numbers, and subsidiaries and branches (entities), for each country in which the firm operates.[2] We utilise this newly available country-level information to document the location of EU financial firms' operations and more pertinently, the extent to which they operate in tax havens. Then, we investigate whether they adjust their geographic segment disclosures when compelled to provide new tax-related information on a disaggregated geographic basis. An attractive feature of this setting is that CBCR provides enhanced visibility of tax haven involvement. We also examine the relationship between tax haven activities and geographic segment disclosure aggregation. Moreover, by focusing on two separate but related geographic disclosures within the same period, we gain a better understanding of managers' overall disclosure strategy (Beyer et al. 2010).

In recent years, multinational corporations (MNCs) have been accused of aggressive tax avoidance and not paying their 'fair share' of taxes.[3] Tax avoidance

[1] The Directive applies to EU headquartered credit institutions and investment firms and subsidiaries established inside the EU of credit institutions and investment firms that are headquartered outside the EU. For brevity, we use the terms 'EU banks' or 'EU financial firms' to describe these firms.
[2] CBCR is expected to lead to firms paying corporate taxes that better reflect their economic presence in each country (Murphy 2016).
[3] We follow Hanlon and Heitzman (2010) and broadly define tax avoidance as all activities undertaken by a firm that reduces its explicit cash taxes.

brings tax system integrity into question and adds strain to national budgets.[4] Since many financial MNCs received large taxpayer-funded government subsidies during the financial crisis, they have been subject to added criticism from international media, civil society campaigners, and supranational bodies including the G20 and OECD.[5] There are two primary concerns. The first is the use of tax havens, and the second is the potential misalignment between the economic substance of transactions and the country in which they are reported for tax purposes.[6] In a report for Oxfam and Fair Finance Guide International, Aubry and Dauphin (2017) find that in 2015, the EU's 20 biggest banks recognised over a quarter of their profits in tax havens, well out of proportion to underlying real economic activity based on turnover and employees.

In response to growing public and political condemnation, global initiatives have been introduced to combat aggressive tax avoidance including the OECD's wide-ranging Base Erosion and Profit Shifting (BEPS) reforms (OECD 2015). These reforms provide countries with better tools to increase the likelihood that profits are taxed where the economic activities generating those profits take place and where value is created. However, prior to the final BEPS package, the European Commission (EC) introduced the CBCR requirements for EU banks in 2013. CBCR was a *late and unanticipated* inclusion within the broad CRD IV adopted by the EU to implement the Basel III banking reforms. The stated objective of CBCR is to restore public trust in the financial services sector in the wake of the financial crisis. In this study, we are interested in financial firms' geographic segment disclosures in the presence of contemporaneous CBCR disclosures. In addition to addressing tax avoidance concerns, understanding geographic disclosures is increasingly important as foreign operations represent a growing proportion of many MNC's businesses.

[4] Corporate income tax revenue for the 28 EU Member States averaged 2.5% of GDP in 2013 (Eurostat 2015). According to a study prepared for the European Parliament, the EU loses €50-70 billion in revenues each year due to corporate tax avoidance (Dover et al. 2015).

[5] In the UK, banks have been criticised for not paying an equitable amount of tax since the financial crisis. Losses incurred during the financial crisis generated large tax credits which banks have been able to offset against profits recognised in recent years (Bowers 2015).

[6] Prior literature lacks a clear definition of what constitutes a tax haven and no universally agreed upon list of tax havens exists (Hines and Rice 1994; Dharmapala and Hines 2009). However, the OECD (1998) defined the features of tax havens as low or no taxes, lack of effective information exchange and transparency, and no requirement for substantial real operating activity. Section 3.3.3 discusses our delineation of tax havens for the purposes of this study. Some tax havens are not countries (e.g., Isle of Man is a British Crown Dependency). However, the terms 'country' and 'jurisdiction' are used interchangeably throughout this chapter.

CBCR disclosure requirements surpass the financial reporting requirements of the relevant accounting standards.[7] EU Accounting Directive 2013/34/EU requires EU public interest entities (listed companies, banks, and insurers) to report their consolidated financial statements in accordance with International Financial Reporting Standards (IFRS). The disclosure of current and future tax payments and tax-related assets and liabilities is mandated by International Accounting Standard 12 *Income Taxes*. However, the requirements of IFRS 8 *Operating Segments*, means this information is usually only available at the consolidated level, not at the country level. IFRS 8 mandates the 'management approach' thereby allowing managers discretion in determining the basis for defining operating segments and what information is disclosed in segment reports. Operating segments may be based on product or service lines, geography, legal entity, customer type, or any combination of these, provided it is consistent with the firm's internal operating structure. In contrast, CBCR necessitates *country-level* disclosure of tax-related financial information irrespective of the geographic disclosures provided under IFRS 8.

Managers have discretion when disclosing geographic segments because IFRS 8 requires firms to report segment information consistent with their internal reporting structure. Prior studies demonstrate that managers have incentives to report fewer segments to minimise agency and proprietary costs (Berger and Hann 2003, 2007; Botosan and Stanford 2005). However, the adoption of IFRS 8 has led to an increase in the average number of segments reported, but a decrease in the average number of line items (Crawford et al. 2012; Nichols et al. 2012; Bugeja et al. 2015; Leung and Verriest 2015). Recent studies show that managerial incentives to avoid taxes also play an important role in segment disclosure decisions. Hope et al. (2013) find a negative association between firms' voluntary choice to disclose geographic earnings and tax avoidance. Akamah et al. (2018) find that firms with subsidiaries in tax havens have more aggregated geographic disclosures consistent with them attempting to avoid scrutiny by obfuscating tax haven involvement. Hence, the contemporaneous publication of CBCR and segment reporting may alter the cost-benefit equilibrium of geographic segment disclosures.

[7] Bushman (2014) notes the tension created by the differing objectives of accounting standard setting versus bank regulation.

Motivated by the increased scrutiny of EU financial firms' tax arrangements, we rely on the unexpected introduction of public CBCR to examine several research questions. First, we exploit CBCR data to document the location of EU banks' operations, especially the extent to which they operate in tax havens.[8] This new data enables us to test whether EU banks enjoy financial benefits from establishing tax haven operations or recognising profits in these jurisdictions. Second, we investigate whether EU banks change their geographic segment reporting in response to the CBCR disclosure requirements. Specifically, we test whether the adoption of CBCR results in a change in the number of geographic segments, country segments, or geographic segment line items disclosed. Third, we utilise the CBCR data to develop new measures of tax haven activity based on the proportion of a firm's profit/loss before tax or turnover disclosed in tax havens. We then examine whether the intensity of tax haven involvement is associated with geographic segment disclosure aggregation. These tests advance the research design in Akamah et al. (2018) where the proxy for tax haven involvement is limited to the location of tax haven subsidiaries.

We have four main findings using our hand-collected sample of 70 EU banks. First, we find that banks operating in tax havens enjoy significantly *higher* profit margins, turnover per employee, and profit per employee; and significantly *lower* book effective tax rates (ETRs), in these countries relative to their non-tax haven operations. Second, using a difference-in-differences research design, we find no significant change in the number of geographic segments, country segments, or line items per geographic segment, disclosed in segment reporting notes after the introduction of CBCR relative to a control sample of 39 multinational EU insurers. Third, consistent with the results in Akamah et al. (2018), we find evidence of a positive association between the intensity of tax haven involvement and geographic segment aggregation. Finally, we document several instances of possible non-compliance with CBCR and IFRS requirements uncovered during our investigation.

This study makes several contributions. To the best of our knowledge, this is the first investigation of the relationship between mandatory public CBCR and operating

[8] Prior research could only gauge firms' geographic footprint imperfectly via geographic segment disclosures or from subsidiary-level data available from certain databases (e.g., Bureau van Dijk's Orbis database). Alternatively, studies of US firms rely on the disclosure of subsidiary location in Exhibit 21 of Form 10-K. However, subsidiaries may operate in multiple countries thereby impeding analysis of country-level operations.

segment disclosures. Therefore, the findings expand our understanding of the relationship between mandatory disaggregated geographic tax disclosures and financial reporting behaviour. Second, we exploit the granular nature of CBCR data and develop new proxies of tax haven intensity based on country-level profits and turnover. Prior studies rely on measures based purely on the disclosure of subsidiary location, whereas our measures provide a richer understanding of the extent to which EU financial firms' use tax havens. Third, we extend prior research exploring the association between geographic financial disclosures and corporate tax avoidance (Hope et al. 2013; Akamah et al. 2018). Fourth, we add to the recent literature on how firms respond to an increase in transparency facilitated by the mandatory disclosure of certain elements of their tax arrangements (Dyreng et al. 2016). Fifth, we provide evidence on the reporting behaviour of financial firms typically omitted in prior tax studies (Hanlon and Heitzman 2010). Sixth, we expand the literature examining tax avoidance behaviour of non-US firms (Markle and Shackelford 2012a, 2012b; Atwood et al. 2012; Dyreng et al. 2016).

Finally, our findings should inform policy makers in two important ways. First, EU policy makers and regulators should be interested in the results given they are currently deliberating the possible extension of public CBCR to firms in all industries. Second, global accounting standard setters may be interested in the results to improve their understanding of the interplay between IFRS 8 and other mandatory geographic disclosure requirements.

3.2 Background and hypothesis development

3.2.1 Geographic reporting requirements

MNCs, by definition, have operations spanning numerous countries. Consequently, their consolidated financial statements report accounting information that aggregates the results of multiple subsidiaries located in several countries. However, since 2013, detailed information regarding the geographic operations of an EU bank can be obtained from two sources – the segment reporting note in the consolidated financial statements, and the CBCR located in the annual report or on the firm's website.

3.2.1.1 Segment reporting

Segment reporting is the disaggregated disclosure of a firm's financial statements into operating segments designed to provide more decision-useful information about a company's operations and prospects. Segment information is important to users of financial statements such as investors and financial analysts in assessing and predicting firm performance (Thomas 2000; Hope et al. 2009). Segment disclosures for firms with diversified operations and/or geographic spread, provide information to capital market participants incremental to that provided in the consolidated financial statements and allows users to better evaluate the underlying sources of consolidated earnings. In 2006, the International Accounting Standards Board (IASB) converged segment reporting under IFRS with US GAAP by issuing IFRS 8 *Operating Segments*, for reporting periods beginning on or after 1 January 2009.[9,10]

Under the 'management approach' in IFRS 8, reportable segments must reflect the underlying business units that report directly to the firm's 'chief operating decision maker' (CODM). Specifically, key financial data must be disclosed for the business areas or segments in which the firm is divided for commercial reasons. Effectively, the approach aligns external segment reporting with the firm's internal organisation for operating decision purposes. Under IFRS 8, information must be disclosed in the financial statement notes for all 'reportable segments' (operating segments or aggregations of operating segments that contribute 10% or more of total sales, profits or assets).[11] Operating segments are defined as components of an entity: (i) that engage in business activities earnings revenues and incurring expenses; (ii) whose operating results are regularly reviewed by the CODM; and (iii) for which discrete financial information is available.[12]

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[9] The equivalent requirement for publicly-listed US firms is contained in ASC 280 *Segment Reporting* (previously SFAS 131 *Disclosures about segments of an enterprise and related information*).

[10] IFRS 8 replaced International Accounting Standard 14 Revised (IAS 14R).

[11] Reportable segments are operating segments, or aggregations of operating segments, that meet specified criteria (IFRS 8.13): (i) its reported revenue is 10 % or more of the combined revenue of all operating segments; or (ii) the absolute measure of its reported profit or loss is 10% or more of the greater, in absolute amount, of (a) the combined reported profit of all operating segments that did not report a loss, and (b) the combined reported loss of all operating segments that reported a loss; or (iii) its assets are 10% or more of the combined assets of all operating segments.

[12] IAS 14R mandated a two-tier approach that required disclosure of primary segments *and* secondary segments. Managers could choose between line of business and geographic regions as the basis for disclosure. If primary segments were based on line of business (geography), then secondary segments were based on geography (line of business). For primary (secondary) segments, firms were required to

Interestingly, IFRS 8.23 only mandates disclosure of segment profitability and assets. Revenues, income tax expense, depreciation, capital expenditure, and liabilities, are required to be disclosed *only* if this information is regularly provided to the CODM. Central to this study, IFRS 8.33 prescribes certain entity-wide disclosures irrespective of the basis used to identify operating segments. Specifically, it requires disclosure of revenues and non-current assets by *geographic* area. However, if an individual foreign country is considered *material*, the firm is required to disclose this information at the country-level. Surprisingly, IFRS 8 does not define 'material', nor does it provide clear guidance on the issue (Leung and Verriest 2015).[13] Furthermore, segment line items are not required to be measured in accordance with IFRS, provided they are consistent with internal reporting practices, that is, as reported to the CODM. Nichols et al. (2012) argue that because IFRS 8 does not define segment revenue, result, assets or liabilities, entities have more discretion in determining what is disclosed in segment reports.

The IASB anticipates several improvements in financial reporting following IFRS 8 adoption (IASB 2013). The IASB expects increased consistency among various elements of the annual report such as between the management discussion and analysis section and the financial statements. Furthermore, the IASB believes investors will be able to predict future cash flows more reliably because they are now able to see the business through management's eyes. However, IFRS 8 falls short of requiring the type and level of information the CBCR requirements demand of EU banks (discussed in Section 3.2.1.2 below). Notwithstanding, some proponents of greater financial transparency propose that the IASB should consider CBCR, possibly through an extension of IFRS 8 (Devereux 2011). Still, others maintain that consolidated financial accounts are not an appropriate platform to provide CBCR and thus CBCR cannot be embedded in IFRS 8 (Evers et al. 2014).

Concerns voiced about IFRS 8 include the failure to define segment revenue, result, assets or liabilities; reduced comparability due to the ability to report non-IFRS

disclose revenue, result, assets, liabilities, capital expenditures, depreciation, basis of inter-segment pricing, non-cash expenses, equity method income, and a reconciliation to the consolidated accounts (revenue, assets, capital expenditures). See Nichols et al. (2012, 2013) for a detailed discussion of the previous requirements under IAS 14R.

[13] Also, IFRS 8 does not require any geographic information to be disclosed if this is not prepared for internal use, nor is it required as entity-wide disclosures if the cost of preparing this information is deemed excessive.

measures; omission of key information because it is not regularly reported to the CODM; and unavailability of *geographic* information for key items (European Parliament 2007; IASB 2013; Moldovan 2014). Accordingly, while the European Parliament supports the EC's endorsement of IFRS 8, as a condition of its support, it requires the EC to closely monitor the application of the standard, paying specific attention to *geographic* reporting, segment profit/loss, and use of non-IFRS measures (European Parliament 2007). On 29 March 2017, the IASB published the Exposure Draft 'Improvements to IFRS 8' for public consultation.[14] The proposed amendments include requiring firms to provide information in the financial statement notes if segments in the financial statements differ from segments reported elsewhere in the annual report (e.g., management commentary) or in accompanying materials (e.g., other financial presentations). CBCR disclosures may be a source of difference between geographic classifications in the annual reporting package.

3.2.1.2 Country-by-country reporting (CBCR)[15]

The idea that MNCs should publish in their annual financial report, certain financial information for every jurisdiction in which they operate, was first proposed by Murphy (2003).[16] Subsequent CBCR proposals (PWYP 2005; Murphy and TJN 2010, 2012), were submitted to the IASB and EC during public consultations on segment reporting standards and CBCR, respectively.[17] The IASB submissions were made prior to the adoption of IFRS 8 and were largely disregarded (Wojcik 2015), while the EC submissions added to the ongoing debate regarding CBCR for EU firms.[18] However, the financial crisis proved to be a catalyst that led to calls for an internationally coordinated response to the abusive exploitation of tax law loopholes.

[14] The proposed amendments follow the Post-Implementation Review of IFRS 8 finalised in July 2013. Available at: http://www.ifrs.org/Current-Projects/IASB-Projects/PIR/clarifications-to-IFRS-8-arising-from-the-post-implementation-review/Pages/Exposure-Draft-and-Comment-letters.aspx.

[15] See Chapter 2 for a detailed discussion of the CBCR chronology, EITI, BEPS project, and CRD IV.

[16] However, the Extractive Industries Transparency Initiative (EITI) was created in 2002 although it differs in its purpose and requirements and has only risen to prominence in recent years with US (2012) and EU adoption (2013). The EITI is a global standard to improve transparency and accountability of revenues from natural resources (production of oil, natural gas and minerals). See http://eiti.org.

[17] Publish-What-You-Pay (PWYP) is an international coalition of civil society organisations that advocates for financial transparency in the extractive industry. The Tax Justice Network (TJN) is an international non-profit organisation dedicated to promoting tax reform concerning tax avoidance, especially in poorer countries.

[18] In a December 2012 report, the IASB postponed CBCR deliberations to a future unspecified date (http://www.internationaltaxreview.com/Article/3133003/IASB-rejects-new-accounting-standard-for-income-taxes-and-country-by-country-reporting.html)

This culminated in the development of the OECD's BEPS project in 2013 (OECD 2013a, 2013b). Final recommendations were delivered in 2015 (OECD 2015) including the requirement that MNCs submit a CBCR to tax authorities. This form of CBCR will *not* be publicly disclosed. Rather, it is designed a risk management tool for tax authorities and data will only be shared between tax administrations.

In parallel with the OECD's BEPS project, the EU adopted CBCR within the broader CRD IV in July 2013. The stated objective of the CBCR requirements (Recital 52), is 'restoring the trust of EU citizens in the financial services sector in the wake of the global financial crisis'. Article 89 of CRD IV requires that EU banks publicly disclose the following data on a country-by-country basis: (i) name(s), nature of activities and geographic location; (ii) turnover; (iii) number of employees on a full-time equivalent basis; (iv) profit or loss before tax; (v) corporation tax paid; and (vi) public subsidies received.[19,20] CBCR disclosures may be prepared on a consolidated basis and can be published in firms' annual financial statements or on their website, provided the data is easily accessible.[21] Disclosures are required to be audited from 2015 (i.e., the auditing requirement commences for 2014 data). Interestingly, on 12 April 2016, the EC proposed an amendment to Accounting Directive 2013/34/EU to require the public disclosure of CBCRs by firms in *all industries*.[22] Firms within the scope of these proposed amendments include those with consolidated turnover exceeding €750 million operating in the EU. The disclosures are the same as those currently required of EU banks under Article 89 of CRD IV.

[19] Global Systemically Important Banks (GSIBs) had to report items (i) to (vi) by 1 July 2014 (based on 2013 data). Items (i) to (iii) had to be publicly disclosed and items (iv) to (vi) privately disclosed to the EC. All other EU financial firms were required to publicly disclose all six items in 2015 (based on 2014 data), but had to publicly disclose items (i) to (iii) for 2013 by 1 July 2014. EU GSIBs are: Barclays, BNP Paribas, BBVA, Deutsche Bank, Groupe BPCE, Group Credit Agricole, HSBC, ING Bank, Nordea, Royal Bank of Scotland, Santander, Societe Generale, Standard Chartered, UniCredit. BBVA was not classified as a GSIB in 2016.

[20] A general assessment of the potential economic consequences of the Article 89 requirements concluded that CBCR was unlikely to have a significant negative economic impact and that stakeholders expect the new regulations to increase the transparency of, and public confidence in, the financial sector (PwC 2014).

[21] In approximately 70% of firm-years, CBCRs are provided in the annual report. The timing of CBCR publication for the remaining 30% ranges from the same time as the annual report to several months afterwards.

[22] Available at: http//ec.europa.eu/finance/company-reporting/docs/country-by-country-reporting/160412-proposal_en.pdf.

3.2.1.3 Example of segment reporting and CBCR

For comparative purposes, an example of a segment reporting note and CBCR is provided in Appendix A. These have been taken from the 2016 annual report of Santander. The segment reporting note (Panel A) splits the income statement by geographic segment, while the CBCR (Panel B) disaggregates turnover, employees, gross profit or loss before tax, and tax on profit or loss, by country.[23] The total amounts for turnover (€44,232m) and gross profit or loss before tax (€10,768m) in the CBCR reconcile to the corresponding totals in the segment note.[24,25] Motivating this study is the difference in the level of geographic aggregation between the two disclosures. In the segment reporting note, only two geographies are disclosed at the country-level (UK and US), with the remainder disclosed at an aggregated level (Continental Europe and Latin America). Conversely, the information in the CBCR is disaggregated into 38 countries. However, there are more line items disclosed in the segment reporting note (20 items) compared to the CBCR (4 items).

The results for the UK and US can be matched from the CBCR to the segment reporting note, whereas the remaining countries in the CBCR need to be grouped into the appropriate geographic segment to match with the segment reporting note.[26] For example, in the CBCR, Argentina, Brazil, Chile, Colombia, Mexico, Panama, Paraguay, Peru, Puerto Rico, and Uruguay need to be combined to form the Latin America geographic segment in the segment reporting note. Importantly, the increased geographic granularity in the CBCR reveals that Santander operates in several tax havens that are otherwise aggregated in the segment reporting note.[27] Finally, the CBCR highlights other issues regarding geographic aggregation. For example, it is unclear which of the four geographic segments in the segment reporting note the results for Australia, Canada, China, and Singapore are included.

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[23] Santander defines its reportable segments according to geography.

[24] The total amount for tax on profit or loss before tax (€2,872m) reconciles to cash taxes paid in the cashflow statement (not provided).

[25] Some disclosures of turnover are negative (e.g., Cayman Islands and Jersey) because of the way turnover is defined. Turnover comprises income from equity instruments, share of results of entities accounted for using the equity method, net fee and commission income (expense), other income, and other operating income (expense). Any of these items may be negative for a particular jurisdiction.

[26] Small differences exist between the reported amounts of turnover and profit/loss before tax in the CBCR and segment note for the UK and US. These are likely due to amounts in the corporate centre segment being allocated across countries in the CBCR.

[27] The tax havens are: The Bahamas, Ireland, Isle of Man, Cayman Islands, Jersey, Luxembourg, Malta, The Netherlands, Panama, Singapore, and Switzerland.

3.2.2 Hypothesis development

3.2.2.1 Interaction between segment reporting and CBCR

Given that economic and political risks vary region-by-region, disclosure of geographic information allows users to more accurately forecast future earnings and growth (Thomas 2000; Hope et al. 2009). Yet, many question the usefulness of these financial reporting disclosures because of insufficient disaggregation, lack of comparability across firms, and management manipulation through transfer pricing (Hope et al. 2006; Moldovan 2014).[28] Nonetheless, the introduction of mandatory public CBCR for EU banks renders firm performance more transparent.[29] This may alter managers' incentives to obfuscate segment information because more granular CBCR is published *contemporaneously* with segment reporting disclosures. Thus, the cost-benefit trade-off regarding which geographic segments to report and the number of line items per geographic segment to disclose may change.

Prior studies on the determinants of segment reporting show that managers have incentives to report fewer segments to minimise proprietary costs or agency costs.[30] The proprietary cost hypothesis posits that managers may want to conceal high-performing segments through aggregation to protect abnormal profits in less competitive industries. Hayes and Lundholm (1996) show analytically how a firm chooses an appropriate level of segment aggregation in the presence of potential competitors. Consistent with the proprietary cost argument, they demonstrate that firms aggregate activities when the outcomes of each activity are dissimilar. However, their model predicts firms disaggregate activities into separate segments to enjoy capital market benefits when the outcomes of each activity are sufficiently similar (i.e., competitors learn little).

[28] Nichols et al. (2013) provide a recent review of the literature.

[29] Public CBCR for EU financial firms is a relatively new disclosure requirement and as such the literature examining its consequences is scarce. Evers et al. (2014) and Fuest et al. (2013) argue that annual financial statements are not an appropriate platform to provide CBCR since they are prepared for financial reporting purposes, whereas tax avoidance hinges on the exploitation of tax law loopholes. Instead, consistent with Devereux (2011), they argue that legislators should focus on removing gaps in international tax law. Wojcik (2015) suggests that tax avoidance may decrease in response to CBCR because of reduced information asymmetries between MNCs and tax authorities, and reputational concerns. Longhorn et al. (2016) adopt a stakeholder theory perspective, and argue that CBCR can influence the decisions of all MNC stakeholders while simultaneously ensuring the firm's accountability to them.

[30] Birt et al. (2006) and Bugeja et al. (2015) find support for both proprietary and agency cost reasons.

Studies of segment disaggregation for firms reporting under IAS/IFRS suggest that managers appear to conceal information from competitors. Leuz (2004) examines the first-time adoption of segment reporting in Germany and shows that firms are less likely to provide segment information when product market related proprietary costs are high. Nichols and Street (2007) find a negative association between above industry average return-on-assets and business segment disclosure for international firms under IAS 14R. Andre et al. (2016) find that managers address proprietary concerns either by deviating from the suggested line item disclosure in IFRS 8, or by decreasing segment reporting quality. Empirical results based on US data also support the proprietary cost hypothesis. Harris (1998), Ettredge et al. (2002), and Botosan and Stanford (2005), find that firms in less competitive industries with high concentration ratios or dependent on a few major customers, aggregate more segments under SFAS 14.[31] Berger and Hahn (2003) compare segment disclosures under SFAS 14 and SFAS 131 and find that firms who previously aggregated information under SFAS 14 had higher abnormal profitability. Wang et al. (2011) show that that managers conceal segment earnings growth because of proprietary costs. However, Botosan and Harris (2000) and Ettredge et al. (2006) find evidence that the proprietary costs of revealing additional or higher quality segment information are limited.

In addition, managers may fail to disclose a segment or aggregate a segment for agency reasons if the segment is underperforming and the revelation of its results would highlight moral hazard problems. The adoption of SFAS 131 meant that firms no longer had to disclose geographic earnings. Hope and Thomas (2008) find that SFAS 131 adoption made it easier for managers to engage in foreign empire building because monitoring of foreign activities became harder for firms' shareholders. Consistent with the agency cost hypothesis, Hope and Thomas (2008) report that non-disclosure of geographic segment earnings after SFAS 131 adoption is associated with an increase in foreign operations but a significant decrease in foreign profit margins and lower firm value. Berger and Hahn (2007) document that managers were more likely to hide segments with lower abnormal profits, rather than higher abnormal profits, before SFAS 131 took effect. Their findings are consistent with the idea that

[31] SFAS 14 was the predecessor of SFAS 131. The Financial Accounting Standards Board replaced SFAS 14 with SFAS 131 (now ASC 280) in 1997 following pressure from financial analysts (Herrmann and Thomas 2000).

firms withhold segment information to prevent revealing agency problems and consequential increase in monitoring by shareholders. Exploiting confidential US Census plant-level data, Bens et al. (2011) find that both agency and proprietary costs drive segment aggregation for multi-segment firms but that proprietary cost reasons dominate when the firm reports as a single segment.

In summary, whether and by how much EU financial firms modify their segment reporting in response to increased transparency facilitated by mandatory public CBCR is ex-ante unclear. Nevertheless, it is reasonable to assume that CBCR renders the proprietary cost and agency cost hypotheses defunct due to the concurrent disclosure of country-level information. However, given the scant extant literature, whether these firms alter their behaviour is an empirical question. To examine this question, we implement a difference-in-differences research design using multinational EU insurance firms as the control group. As noted by Beatty and Liao (2014), control firms are difficult to find given that CBCR requirements apply to all banks operating in the EU. However, we believe insurers are an appropriate control group because they are not subject to CBCR disclosure requirements yet operate in a similar financial services-based industry. Furthermore, like EU banks, EU insurers are subject to a level of regulatory oversight and supervision over and above that experienced by firms in other industries.[32] This leads to the following hypotheses:

H1a: The number of reported geographic segments changes for EU banks relative to EU insurers after the introduction of mandatory public CBCR.

H1b: The number of reported country segments changes for EU banks relative to EU insurers after the introduction of mandatory public CBCR.

H1c: The number of reported line items per geographic segment changes for EU banks relative to EU insurers after the introduction of mandatory public CBCR.

[32] The selection of multinational EU insurers as the control group is discussed in more detail in Chapter 2.

3.2.2.2 Relationship between geographic segment disclosure and corporate tax avoidance

Recent leaks of confidential documents such as the 'Panama Papers' and 'Lux Leaks' has led to further allegations of tax avoidance by MNCs. These scandals added to the ongoing public debate that many MNCs pay little corporate income tax despite being highly profitable (Fuest et al. 2013). In particular, MNCs are accused of shifting taxable profits to low tax countries or tax havens that impose zero tax (Gravelle 2009; Huizinga and Laeven 2008; Klassen and Laplante 2012). In 2013, approximately 20% of US firms' profits were recognised in tax havens, a tenfold increase since the 1980s (Zucman 2014).

Public CBCR reveals more detail regarding EU banks' tax arrangements which may intensify public scrutiny and negatively impact these firms through reputational costs, increased tax authority audit activity and enforcement actions, or increased proprietary costs. Chapter 2 discusses the mixed results of the extant literature examining the consequences of increased transparency of tax avoidance. In summary, on the one hand, studies document negative effects including adverse equity market reactions (Hanlon and Slemrod 2009; Dyreng et al. 2016), increased scrutiny from institutional investors (Ram 2016a, 2016b), and damaged relationship with governments (Mills et al. 2013). On the other hand, tax avoidance can lead to increases in both accounting earnings and cash flows and new information about a firm's commitment to tax avoidance may in fact be rewarded by the capital market (Bryant-Kutcher et al. 2012; Huesecken et al. 2017; Nesbitt et al. 2017). However, Gallemore et al. (2014) find no evidence that firms or their top executives face significant reputational costs from tax shelter involvement.

Several US studies demonstrate that managerial incentives to avoid taxes can also play an important role in segment disclosure decisions. First, Hermann and Thomas (2000) show that most firms in their sample include the results of foreign operations in more aggregated geographic areas such as 'Other Foreign', despite ASC 280 requiring firms to report the results of foreign operations by material country. Second, Hope et al. (2013) document that managers attempt to obfuscate tax avoidance activities by not disclosing geographic earnings. They find that following the adoption of SFAS 131 in 1998, the majority of firms in their sample voluntarily choose not to

disclose their geographic earnings and that this is associated with significantly lower ETRs (higher tax avoidance).[33] Third, Krapat et al. (2016) find that during the 2007-2012 period, many MNCs significantly reduce the number of foreign subsidiaries publicly disclosed in Exhibit 21 of Form 10-K.[34] The authors find that these firms increase their tax aggressiveness relative to firms with little or no reduction in the reported number of foreign subsidiaries. Finally, Akamah et al. (2018) show that firms with tax haven operations tend to aggregate their geographic segment disclosures consistent with them attempting to mask their tax haven involvement. The authors conclude that public CBCR would better highlight tax avoidance.

Taken together, the preceding discussion implies that managers have incentives to minimise or avoid criticisms stemming from having tax haven operations by making such activities less transparent via more aggregated geographic disclosures. Nevertheless, whether EU financial firms aggregate their geographic segments in the presence of increased transparency facilitated by mandatory public CBCR is ex-ante unclear. This leads to the following hypothesis, stated in null form:

H2: EU banks' use of tax havens is not associated with geographic segment aggregation.

3.3 Research design

3.3.1 Measures of geographic segment reporting quantity

We are initially interested in the influence, if any, of CBCR on geographic segment disclosures. Two key aspects of geographic segment reporting are the reportable segments disclosed and the amount of information provided for each segment. These elements are easily observable characteristics of segment disclosure (Andre et al. 2016).[35] Hence, in our analysis of H1a-H1c, we follow recent studies (Bugeja et al. 2015; Leung and Verriest 2015) and focus on the *quantity* of geographic

[33] However, the effects diminished with the introduction of Schedule M-3 in December 2004 which requires MNCs to provide a detailed reconciliation of book-tax differences in their tax return to the IRS including detailed information on each foreign entity (Hope et al. 2013).
[34] Exhibit 21 provides a list of the firm's material subsidiaries, as required by the SEC. The materiality benchmark is 10% of total assets, pre-tax income, or investment per individual subsidiary as well as on an aggregate basis. Accordingly, all individually disclosed subsidiaries must constitute more than 90% of total assets, income, or investment (Item 601 of SEC Regulation S-K (§229.601)).
[35] The quality of segment reporting (e.g., whether the operating segments are properly defined), is less visible and harder to understand compared to quantity (Andre et al. 2016).

segment reporting information (*SRI*) using three proxies.[36] First, we count the number of geographic segments reported in the segment reporting note (*NUM_GEO_SEG*). Second, within *NUM_GEO_SEG*, we separately identify the number of country geographic segments reported (*NUM_CTRY_SEG*). Third, we tally the number of line item disclosed per geographic segment (*NUMITEMS_GEO_SEG*).[37] Yet, as noted by Leung and Verriest (2015), a caveat is required for the *NUMITEMS_GEO_SEG* measure because under IFRS 8, firms that have identified business segments as reportable segments need only disclose revenues and non-current assets on a geographic basis in their entity-wide disclosures.

3.3.2 Measures of geographic segment aggregation

To test H2, we follow Akamah et al. (2018) and employ two measures that reflect the level of aggregation (*AGG*) in geographic segments. The primary measure, *NOMATCH*, is the proportion of countries in which the firm operates, not disclosed at the country level in geographic segment disclosures. However, there are two potential drawbacks of this *AGG* variable. First, Akamah et al.'s (2018) *NOMATCH* variable is based on the Exhibit 21 list of countries in which material subsidiaries are located. Notably, US firms are not required to provide any financial information for these subsidiaries meaning the scope of geographic operations is indeterminable.[38] Second, IFRS 8 only requires entity-wide disclosures for individual foreign countries if they are 'material', thus permitting immaterial countries to be aggregated. Consequently, smaller countries are, on average, more likely to be aggregated and less likely to be disclosed as stand-alone geographic segments in the segment reporting note. Hence, the *NOMATCH* variable may be an imprecise reflection of the mapping of countries into geographic segments. In contrast, CBCR requires financial information to be reported at the *country-level* thereby allowing an assessment to be made of the scope and materiality of the firm's geographic operations.

[36] We follow Bugeja et al. (2015) and Leung and Verriest (2015) and disregard segments with titles such as 'headquarters' or 'corporate', or segments that are reconciliation segments, because these do not meet the definition of operating segment in IFRS 8.
[37] Using the example in Appendix A to illustrate, *NUM_GEO_SEG* equals 4, *NUM_CTRY_SEG* equals 2, and *NUM_ITEMS_GEO_SEG* equals 20.
[38] Furthermore, Krapat et al. (2016) find that between 2010 and 2014, more than 250 US MNCs reduce the number of material foreign subsidiaries disclosed in their Exhibit 21 by more than 50% and that these firms become more tax aggressive after reducing the disclosure of these foreign subsidiaries.

The finer CBCR data enables the introduction of an important step prior to calculating the *AGG* measures. First, we identify 'material' countries in firms' CBCRs. Recall that IFRS 8 mandates disclosures for all operating segments or aggregations of operating segments that contribute 10% or more of the total sales, *or* total profits, *or* total assets, of the firm. Therefore, we select the 10% threshold embedded within IFRS 8 as a suitable benchmark for identifying 'material' countries. Although CBCRs do not include country-level information on assets, country-level information on turnover and profit/loss before tax is disclosed. Thus, from disclosures made in the CBCR, a country is classified as material if the turnover *or* profit/loss of that country exceeds 10% of total firm turnover or profit/loss before tax, respectively. IFRS 8 does not define materiality, so to increase the likelihood that we identify all material countries, a 5% threshold is also used.[39] One would expect the countries we identify as material to be disclosed as stand-alone geographic segments if the firm defines reportable segments by geography, or alternatively, as stand-alone countries within the entity-wide disclosures. We believe that the introduction of this step provides greater comfort that the *NOMATCH* aggregation variable better reflects the mapping of material countries into geographic segments.

After determining material countries in the CBCR, we then match these countries to their related geographic title in the geographic segment note. Accordingly, *NOMATCH_MAT* is the proportion of *material* countries not disclosed at the country level in geographic segment disclosures. The two versions of this variable (*NOMATCH_MAT_10* and *NOMATCH_MAT_5)* are calculated using the 10% and 5% materiality thresholds, respectively. In the example provided in Appendix A, total turnover (profit/loss before tax) per the CBCR is €44,232m (€10,768m), so the materiality threshold at the 10% (5%) level is €4,423m (€2,212m) *or* €1,077m

[39] On 14 September 2017, the IASB published Practice Statement (PS) 2 *Making Materiality Judgements* as guidance to assist preparers in applying the concept of materiality to financial statements prepared in accordance with IFRS. Firms are not required to comply with the PS unless specifically required by their jurisdiction. While the PS states that applying materiality involves assessing qualitative and quantitative factors, numerical thresholds are not provided. Rather, the assessment of whether information is material depends on its size and nature, judged in the particular circumstances of the entity (para. 41). Nevertheless, International Standard on Auditing 320, *Materiality in Planning and Performing an Audit*, states that 'Misstatements, including omissions, are considered to be material if they, individually or in the aggregate, could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements' (Para. 2). Paragraph 4 states that 'the auditor's determination of materiality is a matter of professional judgment, and is affected by the auditor's perception of the financial information needs of users of the financial statements'.

(€538m), respectively. Five countries (Brazil, Spain, US, Mexico, and UK) qualify as material countries at the 10% materiality level, while three more (Chile, Poland, and Portugal) are added to this list when the 5% materiality threshold is applied. Only two countries (UK and US) are disclosed as stand-alone geographic segments in the segment reporting note. Therefore, only these two countries can be matched leaving 3 (6) countries unmatched at the 10% (5%) materiality levels. Thus, *NOMATCH_MAT_10* equals 0.60 (3/5) while *NOMATCH_MAT_5* equals 0.75 (6/8).

To calculate the second geographic aggregation score, *LEVEL_MAT*, we follow Akamah et al. (2018) and assign a geographic fineness score to each geographic title disclosed in the geographic segment note for each firm over the sample period.[40] This score captures the level of disaggregation and ranges from 0 (when the firm reports at the country or within-country level) to 4 (when the firm reports results where the geographic region cannot be traced using terms like 'other', 'international', or 'rest of world').[41] Then, each material country identified in the CBCR receives an aggregation score corresponding to its related geographic segment disclosure. *LEVEL* is the average aggregation score of the material countries identified from the CBCR. We employ two versions of *LEVEL_MAT*, one each using the 10% (*LEVEL_MAT_10*) and 5% (*LEVEL_MAT_5*) materiality thresholds. For the example provided in Appendix A, *LEVEL_MAT_10* equals 0.90 (total aggregation score of 4.5 divided by 5 material countries) whereas *LEVEL_MAT_5* equals 1.13 (total aggregation score of 9.0 divided by 8 material countries).[42]

3.3.3 Measures of tax haven use

The development of proxies for tax haven use is challenging because no widely-accepted definition or list of tax havens exists. Nonetheless, prior studies rely on tax haven lists developed over time primarily based on those created by Hines and Rice (1994) or the OECD (2000).[43] The list created by Hines and Rice (1994) classified tax havens as small 'dot' havens (populations less than 1 million in 1982) or 'Big 7' havens (populations greater than 1 million). Dot havens were deemed too small in

[40] Leung and Verriest (2015) use a similar geographic fineness score.
[41] Appendix C describes the full scale used.
[42] The aggregation score is calculated in accordance with the scale provided in Appendix C.
[43] Both lists contain 41 jurisdictions but differ in terms of constituents e.g., the OECD list does not include Hong Kong, Ireland, Luxembourg, Singapore, or Switzerland. Surprisingly, the OECD has not updated its list since 2000.

terms of economic activity, workforce, or infrastructure to offer benefits other than tax minimisation. This list has been used in subsequent studies (Desai et al. 2006; Dyreng et al. 2016) to compare results between the two groups of tax havens. Nevertheless, the composition of the list used in our study is crucial because several jurisdictions deemed tax havens on some lists are relatively large European countries (e.g., Ireland, Netherlands) or global financial centres (e.g., Hong Kong, Switzerland, Singapore). Thus, our sample firms are more likely to have legitimate operations in these jurisdictions, especially those headquartered in Ireland and the Netherlands. These firms are less likely to be concerned about disclosing activity in these tax havens and are more likely to disclose these jurisdictions as stand-alone geographic segments, unduly influencing our *AGG* measures.

We begin with the most recent tax haven list used in the literature by Dyreng et al. (2015) who augment the list used by Dyreng and Lindsey (2009) by adding Hong Kong and the Netherlands since these countries are widely viewed as tax havens (total of 54 tax havens). Then, given the passage of time and worldwide population growth since 1982, we follow similar logic to that in Hines and Rice (1994) and split the tax havens into the 'Big 12', defined as tax havens with populations exceeding 1.6 million as at December 2015, and all others as 'dots'.[44] The resulting two lists of tax havens are provided in Appendix B. We use List 1 in our primary analysis. This list is similar to that used in Jaafar and Thornton's (2015) study of the impact of tax haven use on publicly-listed and privately-held European firms. In total, 52 countries are disclosed in the geographic segment disclosures giving 710 firm-year observations. The 'Big 12' tax havens account for 78 or 11.2% of these observations, providing support for our argument to exclude these jurisdictions from the primary list of tax havens.

The variable (*HAVEN*) reflects the extent to which EU banks use tax havens to reduce their tax burden. Prior studies (Markle and Shackelford 2012b; Dyreng et al. 2016; Akamah et al. 2018) rely upon proxies for tax-haven intensity based on the disclosure of material subsidiaries in tax havens. However, an advantage of CBCR is that it facilitates the development of new measures of tax haven activity not previously used in the literature. Recall that EU banks must disclose the turnover, profit/loss

[44] World population increased by 59.8% from 4.60bn in 1982 to 7.35bn in 2015 per UN statistics (available at: https://esa.un.org/unpd/wpp/Download/Standard/Population/).

before tax, and entities for *every* country they operate in.[45] As our primary measure of *HAVEN*, we use *THAV_PBT*, calculated as the ratio of profit/loss before tax disclosed in tax haven countries to total profit/loss before tax, because this ratio more likely reflects the degree to which firms have shifted profits from non-tax havens to tax havens. In robustness tests, we replace *THAV_PBT* with *THAV_ENT* (*THAV_TO*) calculated as the ratio of entities (turnover) disclosed in tax haven countries to total entities (turnover). Thus, the country-level disclosures provided by CBCR enable us to use multiple measures of tax haven intensity to gain a deeper understanding of the link between firms' tax haven involvement and their segment disclosures.

Several reasons suggest that our measures likely understate the extent of firms' involvement in tax havens. First, home country activities of banks headquartered in Cyprus, Ireland, and the Netherlands, have been treated as non-tax haven activities to avoid skewing the results. However, these firms possibly engage in some degree of profit-shifting *back* into their home country, though the extent to which they engage in such activity is unobservable. Second, several banks aggregate tax havens into other countries in their CBCR. For example, in 2013, HSBC included the results of the Channel Islands within the UK results. Third, CBCR disclosures are only required at the country-level which may mask some tax haven activity within certain countries e.g., some firms have operations located in the US State of Delaware which is considered a tax haven by many. Finally, some banks include tax havens within a 'Other' category in their CBCR (discussed in Section 3.6.1).

3.3.4 Multivariate tests

3.3.4.1 Geographic segment reporting and the introduction of CBCR

We examine whether EU banks change their segment reporting *after* CBCR is implemented. Based on prior research (Leung and Verriest 2015; Bugeja et al. 2015) we initially estimate the following empirical model using OLS:

$$SRI_{i,t} = \beta_0 + \beta_1 POST_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (1)$$

[45] They must also disclose the name(s), nature of activities and geographic location of all subsidiaries and branches (entities). However, they are not required to disclose financial information for individual entities and therefore information on the relative size of individual entities is unavailable.

The dependent variable (*SRI*) is one of the three proxies for the quantity of geographic segment information disclosed (*NUM_GEO_SEG*, *NUM_CTRY_SEG*, and *NUMITEMS_GEO_SEG)*. The coefficient on *POST* reflects any change in *SRI* in the years after CBCR is implemented in 2013 (i.e., 2014 onwards). The model also controls for several firm-level characteristics that may influence segment reporting quantity. Larger firms (*SIZE*) provide better disclosures, and increased profitability (*ROA*) alleviates agency problems potentially leading to enhanced disclosures, although more profitable firms may incur higher proprietary costs inducing fewer segment disclosures. Firms that use more leverage (*LEV*) may increase disclosure quantity to ease agency costs with lenders, while firms with higher growth opportunities (*REVGRTH*) have incentives to disclose more segment information.[46] Firm complexity may result in more segments or more segment information being disclosed, so an additional control is included for the number of countries in which a firm discloses it has entities (*NUM_CTRY_ENT*).[47] All variables are defined in Appendix C.

Then, to implement our difference-in-differences research design, we augment Equation (1) by including an indicator variable called *EU_BANK* that takes the value of 1 if the firm is an EU bank and 0 if it is an EU insurer. The interaction of *EU_BANK* and *POST* is also added to give Equation (2):

$$SRI_{i,t} = \beta_0 + \beta_1 EU\_BANK_{i,t} + \beta_2 EU\_BANK_{i,t} * POST_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (2)$$

The coefficient β_1 reflects the average difference in *SRI* between treatment and control firms in the pre-CBCR period. To test all hypotheses, we examine β_2, the coefficient on *EU_BANK*POST* which is the difference-in-differences estimate of the effect of CBCR on *SRI*. A positive (negative) coefficient on this interaction variable indicates an increase (decrease) in the quantity of geographic segment information disclosed of EU financial firms relative to EU insurance firms.

[46] We use *REVGRTH* instead of market-to-book because 25 sample firms (22.9%) are unlisted.
[47] Data for this variable is only available from 2013 so we use the 2013 values for 2012 because these values are very stable over the sample period. In untabulated robustness tests, we drop the 2012 values and inferences remain unchanged.

Finally, given the relatively small sample size, we are concerned that the standard errors could be biased downwards because asymptotic inference may be unreliable in small samples (Imbens and Kolesar 2016). To alleviate concerns regarding imprecise standard errors, we follow Dyreng et al. (2016) and use bootstrapped standard errors which are robust to different structures in the data. We estimate bootstrapped standard errors using 1,000 iterations (with replacement) for each model.

3.3.4.2 Tax haven use and geographic segment aggregation

We examine the relationship between the intensity of tax haven involvement and geographic segment aggregation. Following Akamah et al. (2018) we estimate the following empirical specification to test H2:

$$AGG_{i,t} = \beta_0 + \beta_1 HAVEN_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (3)$$

The dependent variable (*AGG*) is one of the four geographic aggregation proxies discussed in Section 3.3.2 and *HAVEN* is one of the tax haven intensity variables discussed in Section 3.3.3. The coefficient of interest is β_1 which reflects the impact of *HAVEN* on *AGG* for all sample firms. However, 22 EU banks or 31.4% of the primary sample are not publicly-listed so to capture any potential differences in financial reporting incentives between listed and unlisted firms, we augment Equation (2) by including a dummy variable (*UNLISTED*) for listing status along with the interaction between *UNLISTED* and *HAVEN*. In Equation (4), the coefficients of interest are β_1 and $\beta_1 + \beta_3$. β_1 captures the impact of *HAVEN* on *AGG* for listed firms, while $\beta_1 + \beta_3$ captures this relationship for unlisted firms.

$$AGG_{i,t} = \beta_0 + \beta_1 HAVEN_{i,t} + \beta_2 UNLISTED_{i,t} + \beta_3 HAVEN_{i,t}*UNLISTED_{i,t} + \sum \beta_k CONTROLS_{i,t} + \varepsilon_{i,t} \quad (4)$$

The models include the same control variables included in Equation (1) because prior studies show that these control variables influence disclosure levels.[48] Furthermore, following Akamah et al. (2018) we also control for firm characteristics previously shown in the literature to be related to tax avoidance or tax haven operations. These include intangible assets (*INTANG*), capital intensity (*CAPINT*),

[48] Prior papers also include a variable for audit quality (BIG4 dummy) however all sample firms are audited by Big 4 auditors during the sample period.

and tax loss carry forwards (Δ*TLCF* and *TLCF_DUM*). Because both *NOMATCH* variables are measured as proportions (between 0 and 1), the OLS estimators of the parameters may be inconsistent. Therefore, we treat these variables as censored continuous variables and employ TOBIT regression (Stock and Watson 2012). We use OLS regression when the dependent variable is either of the *LEVEL* variables.

3.4 Sample selection and descriptive statistics

3.4.1 Sample selection

The population for the primary sample comprises all EU banks since they all fall within the scope of the new CBCR rules. We start with the European Banking Authority's List of Institutions for Supervisory Reporting as at January 2016 (198 firms).[49] We then apply several data filters. For example, only large banks and those who have operations in more than one country are included as they are more likely to be impacted by the CBCR requirements.[50] Panel A of Table 3.1 outlines the sample selection process for the primary sample. The final sample of banks contains 70 firms covering the period 2012-2016.[51,52] Panel A of Table 3.2 reveals that these firms have combined total assets of €30,902bn as at 31 December 2016 which represents 92.5% of the €33,410bn in total assets of all EU credit institutions (ECB 2017a). Panel B of Table 3.1 outlines the sample selection process for the control sample of 39 multinational EU insurers. Panel A of Table 3.3 shows that these firms have combined total assets of €6,485bn as at 31 December 2016 which represents 83.4% of the €7,775bn in total assets of all EU insurers (ECB 2017b).[53]

We collected data from a variety of sources. CBCR disclosure items (e.g., turnover, employees) were hand-collected from the annual CBCR of every firm. Some

[49] Consolidated Banking Data published by the European Central Bank (ECB) as at 31 December 2016 reveals 349 banking groups operating in the EU but does not include a list of the firms (ECB 2017a).
[50] For example, Metro Bank and Virgin Money are excluded because they only operate in the UK.
[51] Our sample is identical to that used in Chapter 2 except for two firms that do not provide segment reporting notes in their annual report, namely Credit Suisse Securities (Europe) and UBS Limited.
[52] In the geographic segment reporting analysis, the sample size is 350 firm-year observations (70 firms across 5 years). However, the sample size is reduced in the geographic segment aggregation analysis because CBCR data only becomes available from 2013. Furthermore, the sample size varies depending on which proxy for tax haven involvement is used because most firms do not commence disclosing profit/loss before tax in their CBCR until 2014. Thus, the sample size is 222 (261) firm-year observations when *THAV_PBT* (*THAV_ENT*) is used.
[53] Section 2.4.1 in Chapter 2 discusses the sample selection process in more detail.

firms provide a reference in their CBCR to the list of subsidiaries and branches in the financial statement notes. In these cases, data was hand-collected from the relevant notes to the financial statements.[54] Geographic segment information was hand-collected from the segment reporting note in the financial statements. For the publicly-listed firms, data for the firm-level controls was obtained from *Datastream*, whereas for the unlisted entities, this data was hand-collected from annual reports. Information on carried forward tax losses was hand-collected from the financial statement notes for all firms as this data item is not available on *Datastream*. Finally, our sample size is relatively small and thus our empirical tests could be easily influenced by a few influential observations. To mitigate this risk, we winsorize all continuous variables at the 1st and 99th percentiles. Appendix C provides formal definitions for all variables.

Panel A of Table 3.2 lists the EU banks, their country of residence, GSIB and listing status, and total assets (measured in Euros) as at 31 December 2016. The table reveals the dominance by a relatively small number of large firms. The 14 GSIBs account for approximately 57% of total assets. Furthermore, 48 or 68.6% of sample banks are publicly-listed. Panel B displays the sample split by country. The major EU countries France, Germany, Spain, and the UK, account for a relatively greater proportion of the 14 countries covered. Panel C shows the asset size by firm-type. The mean (median) total assets of the primary sample is €441,451m (€212,329m). Table 3.3 presents details on the EU insurance firms. Panel A shows that similar to EU banks, larger firms dominate the sample. The 13 firms with total assets greater than €100,000m account for approximately 86% of total assets. Panel B reveals that the sample selection process resulted in EU insurers from 9 of the 14 EU countries the banks are based in and that firms from France, Germany, and UK comprise the majority (77.1%) of total assets. Panel C shows that, on average, the insurers are smaller than the banks. The mean (median) total assets of the control sample is €166,279m (€63,612m).

All sample firms consolidated financial statements are prepared in accordance with IFRS and are audited by Big 4 audit firms. This alleviates any concern regarding divergence based on differences in financial statement preparation and presentation.

[54] See Section 2.4.1 in Chapter 2 for a detailed description of the time-consuming process undertaken to obtain information for all subsidiaries of firms in certain countries.

3.4.2 Descriptive statistics

Summary statistics are reported in Table 3.4. On average, reporting segments are based primarily on geography (*GEO_SEG*) in 20.4% of firm-years (includes matrix versions of geographic segmentation), and firms disclose around 14 line items across 4 geographic segments.[55] Furthermore, on average, the 4 geographic segments include approximately 2 stand-alone country segments. However, interestingly, EU banks have significantly lower values of all four measures compared to EU insurers suggesting the latter provide more geographic segment information, on average. The mean of *NOMATCH_MAT_10* (*NOMATCH_MAT_5)* is 0.374 (0.481) which is lower than the mean value of *NOMATCH* (0.846) reported in Akamah et al. (2018), consistent with our expectations. The means of the *LEVEL* variables lie between 1.0 and 1.3 on average, which corresponds to aggregation at the subcontinent/continent levels in the segment reporting note. The tax haven intensity variables (*THAV*) reveal that, on average, EU banks recognise 2.0% of total turnover, 4.3% of total profit/loss before tax, and have 10.2% of their entities, in tax havens (List 1).[56] On average, relative to EU insurers, EU banks are significantly larger and more leveraged, but are significantly less profitable, have lower revenue growth, and use less tangible and intangible assets. Approximately 85% of all sample firms recognise a deferred tax asset for carried forward tax losses. Finally, EU banks (EU insurers) disclose entities in approximately 20 (23) countries, on average.

The Pearson (below diagonal) and Spearman (above diagonal) correlations are presented in Table 3.5 with significant (p-value < 0.05) coefficients reported in bold. Panel A (Panel B) presents the results for the full sample for the changes in segment reporting tests (EU banks for the geographic segment aggregation tests). In Panel A, all three segment reporting variables (*NUM_GEO_SEG*, *NUM_CTRY_SEG*, *NUMITEMS_GEO_SEG*) are significantly positively correlated, although none are significantly correlated with *POST*. In Panel B, all four aggregation variables are significantly positively correlated with one another, suggesting each reflects the same underlying construct.[57] However, only three of eight positive correlation coefficients

[55] These results are similar to those found in Nichols et al. (2012) where 19% of their sample of EU firms determine reporting segments based primarily on geography and an average of 8.38 line items are reported across 4.19 reportable segments.
[56] This increases to 5.2% of turnover, 7.6% of profit/loss before tax, and 17.4% of entities, for List 2.
[57] Likewise, all versions of *HAVEN* are significantly positively correlated (untabulated).

between *THAV_PBT* and the aggregation variables is significant. Some correlation coefficients between control variables are significantly large (e.g., between *SIZE* and *NUM_CTRY_ENT*). Untabulated tests of collinearity result in a mean variance inflation factor (VIF) of 1.67 with a high of 3.24 for *SIZE*. These are well below the generally accepted threshold of 10 alleviating concerns regarding multicollinearity.

3.5 Results

3.5.1 Mandatory CBCR and profit shifting

The introduction of mandatory CBCR facilitates a more extensive analysis of the geographic footprint of EU banks. Specifically, the availability of new data at the *country-level* enables the identification of the countries where firms operate, and most importantly, the level of activity disclosed in tax havens. In Action 11 of the final BEPS project recommendations, the OECD discussed the efficacy of various measures to monitor and evaluate potential profit shifting by MNCs (OECD 2015).[58] In addition to ETRs (the ratio of taxes to pre-tax income), indicators that compare pre-tax profits to assets or employees are evaluated. The use of ratios that link profits to measures of economic activity, recognises that BEPS is characterised by a disconnect between the jurisdictions where taxable profits are reported and the location of the underlying real economic activities generating those profits (OECD 2015).

The financial data required to be disclosed under CBCR permits the determination of profit margin (PM), turnover per employee (TPE), profit per employee (PPE), book effective tax rate (BETR), and cash effective tax rate (CETR), at the individual *country* level.[59] In line with the OECD's recommendations, such measures may provide broad insights into the existence of profit shifting by EU banks.[60] Specifically, higher levels of PM, TPE and PPE, may indicate that firms have shifted profits into those countries. Similarly, lower BETRs or CETRs may indicate that EU banks have paid lower taxes

[58] The OECD concludes that the scale of BEPS and changes in BEPS over time are difficult to measure. Nevertheless, while the existence and scale of BEPS cannot be captured by one single indicator, a 'dashboard' of indicators may provide broad insights (OECD 2015).

[59] All variables are defined in Appendix C. Most firms report either income tax expense or cash taxes paid while a small number report both. Firms disclose financial information in their CBCR in a variety of currencies. Therefore, all data is converted to Euros using average exchange rates.

[60] Fuest et al. (2013) stress that the clear identification of profit shifting is difficult because true country-level profit margins (i.e., profit margins *before* any tax avoidance strategy that affects actual profits is implemented) are not observable. Similar logic applies to the TPE and PPE calculations.

in those jurisdictions by using tax minimisation strategies. Overall, the extent to which a jurisdiction exhibits higher levels of PM, TPE, PPE and/or a lower BETR or CETR relative to other jurisdictions, likely indicates that EU banks find that jurisdiction more attractive as a profit shifting destination.

The key profit shifting indicators are summarised in Table 3.6. Panel A presents the results for the top 30 countries ranked by the frequency with which EU banks disclose turnover or profit/loss before tax in that country, and reveals that the UK, US, and Germany are the most common countries.[61] However, Ireland, a tax haven, has the highest PM of 56.6%, second highest TPE of €60.6m, and highest PPE of €31.8m. Similarly, Luxembourg, despite being a relatively small EU country, has the second highest PM of 54.9%, fifth highest TPE of €50.1m, and second highest PPE of €25.5m. In contrast, the most commonly mentioned country, the UK, has a PM of 35.1%, TPE of €57.2m, and PPE of €12.9m. In total, seven tax havens appear among the top 30 jurisdictions including, in order of frequency, Luxembourg, Ireland, Switzerland, Singapore, Netherlands, Hong Kong, and the Channel Islands.[62] Interestingly, only Luxembourg, Ireland, and the Channel Islands, have higher values of PM, TPE, and PPE, relative to other non-tax haven countries. The results for Netherlands, Singapore, Switzerland, and Hong Kong, are broadly in line with those of non-tax havens. This may reflect the fact that EU bank locate operations in these larger countries for legitimate operating reasons rather than for tax-minimisation (Hines and Rice 1994).[63]

Panel A of Table 3.6 also reveals that some firms use a 'Other' category in their CBCR to aggregate countries not separately disclosed. Surprisingly, this category ranks 17th in terms of frequency of firm-year observations of turnover or profit. The use of this category is discussed in further detail in Section 3.6.1. Panel B of Table 3.6 reports the results for the remaining tax havens. Notably, many tax havens often

[61] Due to the existence of a small number of large outliers, median values of PM, TPE, and PPE are presented. For example, in 2014 BNP Paribus reported turnover of €411m in Switzerland with a corresponding pre-tax loss of €2,900m, while in 2013 RBS disclosed turnover of £1,258m in Ireland with a pre-tax loss of £3,308m.

[62] This finding is similar to that of Dyreng et al. (2009) who also report Ireland, Singapore, Switzerland, Netherlands, and Hong Kong among the top 35 countries used by US firms as locations for material subsidiaries. Luxembourg and the Channel Islands are absent from the list provided in Dyreng et al. (2009) although Barbados, Bermuda, and the Cayman Islands appear on their list. This may reflect a preference of US firms to use tax havens located closer to the US (e.g., those based in the Caribbean) over those havens located in Europe.

[63] For example, Akamah et al. (2018) note that firms have operations in Hong Kong to service their customers in China and East-Asia, and in Singapore to service their Southeast-Asia customers.

referred in the financial media (e.g., Panama), are not used extensively by our sample firms. Panel C presents overall totals (including BETRs and CETRs) split by EU/non-EU countries and tax haven/non-tax haven jurisdictions. Regardless of the tax haven list used, tax havens have *higher* mean and median values of PM, TPE, and PPE, and *lower* mean and median values of BETR and CETR, relative to non-tax havens.

Table 3.7 presents the distribution of key CBCR disclosure items for the 15 tax havens most commonly used by sample firms. Together, the three most popular tax havens (Hong Kong, Luxembourg and Singapore) account for over two thirds of all turnover, profit/loss before tax, and employees, disclosed in tax havens. For example, combined profits recognised in these tax havens totals €13,590m representing 84.1% of total profits of €16,160 recognised in tax havens. These three tax havens also represent over 5.6% of turnover, 15.5% of pre-tax profits, and 3.0% of employees, of *all* countries disclosed in CBCRs. In addition to tax incentives, the results for Hong Kong and Singapore may reflect their importance as global banking centres servicing the Asian market. Furthermore, although Luxembourg has a relatively small population, its popularity may reflect that it is regarded as a leading banking and financial services market.[64] For example, Luxembourg is the leading global centre and distribution hub for EU regulated UCITS (Undertakings for Collective Investment in Transferable Securities) investment funds (EY 2017).[65]

Table 3.8 reports the means for the profit shifting indicators calculated at the firm-level, along with differences in means between tax havens and non-tax havens. Statistics are provided for unconditional means and means conditional upon tax haven use. Panels A, B, and C reveal that EU banks report significantly *higher* PM, TPE, and PPE, for their operations in tax havens relative to their non-tax haven operations. For example, in Panel C, the unconditional mean of PPE for tax havens (List 1) equals 24.3% compared to 5.4% for non-tax havens (difference of 18.9% with a *p*-value of 0.000). The results are consistent when tax havens from either List 1 or List 2 are used. Panels D and E show that sample firms report significantly *lower* BETRs and CETRs in tax havens although results are stronger using unconditional means.

[64] In fact, sample firms disclose more entities in Luxembourg (586) than any other tax haven.
[65] UCITS is a globally recognised brand for retail investment funds. The regime covers products such as equity and bond funds, structured funds, and exchange traded funds. Luxembourg's UCITS assets of over US$2.5 trillion represent about three quarters of internationally distributed products (EY 2017).

Overall, these results provide empirical evidence of the significant financial benefits that accrue to EU banks operating in tax havens and provide prima facie evidence of profit shifting. Furthermore, the findings indicate why some firms may aggregate geographic segments deemed tax havens to obfuscate activities in these politically sensitive jurisdictions.

3.5.2 Segment reporting and the introduction of mandatory CBCR

Table 3.9 reports the results from estimating Equations (1) and (2) when the dependent variable is *NUM_GEO_SEG*. Equation (1) is estimated separately for EU banks and insurers (Models 1-4). Models (1) and (3) exclude control variables, country fixed effects and year fixed effects while Models (2) and (4) include control variables and country fixed effects to control for differences across countries. In all four specifications, the estimated coefficient on *POST* is not statistically significant. Equation (2) is estimated for the full sample in Model (5). This model includes country and year fixed effects.[66] The estimated coefficient on the variable of interest (*EU_BANK*POST*) is also insignificant (-0.140 and *p*-value = 0.814). Hence, we find no support for H1a.

The results from estimating Equations (1) and (2) when *NUM_CTRY_SEG* is the dependent variable are presented in Table 3.10. Similar to the results in Table 3.9, all estimated coefficients on *POST* are not statistically significant. Furthermore, in Model (5) the coefficient on *EU_BANK*POST* is 0.087 (*p*-value = 0.865). Therefore, we find no support for H1b. Table 3.11 reports the results from estimating Equations (1) and (2) when *NUMITEMS_GEO_SEG* is the dependent variable. Again, all estimated coefficients on *POST* are insignificant. The coefficient on *EU_BANK*POST* is -1.172 (*p*-value = 0.731). Thus, we find no support for H1c. Overall, based on the results in Tables 3.9-3.11, we cannot reject the null hypothesis that the number of disclosed geographic segments, country segments, or geographic line items, does not change for EU banks relative to EU insurers after the introduction of public CBCR.

In additional cross-sectional tests (untabulated), we split the primary sample into listed and unlisted firms because 22 (31.4%) of the EU banks are unlisted. We then re-estimate Equation (1). The results are qualitatively similar to those found above

[66] Results are similar if we include *POST* as a stand-alone variable and exclude the year fixed effects.

with one exception. The coefficient on *POST* corresponding to Model (4) in Table 3.11 (dependent variable = *NUMITEMS_GEO_SEG*) is -4.385 (*p*-value = 0.002). This provides evidence of a significant reduction in the number of line items per geographic segment since the commencement of CBCR for unlisted EU financial firms. These firms are subject to less scrutiny from capital market participants such as financial analysts and institutional investors. Therefore, the reduction in geographic segment line item disclosure in the presence of CBCR may be the result of these firms treating the two sets of geographic disclosures as substitutes.

3.5.3 Tax haven use and geographic segment aggregation

Table 3.12 reports the results from estimating Equations (3) and (4) using TOBIT when *NOMATCH_MAT_10* (Models 1 and 2) and *NOMATCH_MAT_5* (Models 3 and 4) are the dependent variable.[67] Models (1) and (3) report the on-average aggregate results, while Models (2) and (4) separate the results between listed and unlisted firms. Toward the bottom of Models (2) and (4), the estimated coefficient on *THAV_PBT* + *UNLISTED*THAV_PBT* is presented along with the result of a χ^2-test of whether it is statistically different from zero. All models include year and country fixed effects to control for differences across time and countries. The estimated coefficient on *THAV_PBT* is 1.233 (*p*-value = 0.028) in Model (1) and 0.840 (*p*-value = 0.011) in Model (3), suggesting that, on average, an increase in tax haven intensity is associated with an *increase* in geographic segment aggregation in the segment reporting note. In Models (2) and (4), the coefficient on *THAV_PBT* is 1.492 (*p*-value = 0.054) and 1.007 (*p*-value = 0.016) respectively, however the estimated coefficient on *THAV_PBT* + *UNLISTED*THAV_PBT* is not statistically significant. These results suggest that the positive association exists for listed but not unlisted EU banks.

The results from estimating Equations (3) and (4) using OLS when the dependent variable is *LEVEL_MAT_10* (Models 1 and 2) and *LEVEL_MAT_5* (Models 3 and 4) are presented in Table 3.13. Consistent with the results in Table 3.12, we find a statistically significant positive coefficient on *THAV_PBT* in Models (1) and (3). In Model (1) the estimated coefficient on *THAV_PBT* is 2.204 (*p*-value = 0.014) and in Model (3) is 1.995 (*p*-value = 0.015). The positive coefficient on *THAV_PBT* in

[67] In untabulated robustness tests, we estimate the models using OLS and inferences remain unchanged.

Models (2) and (4) is mildly significant at conventional levels (*p*-value = 0.110 and *p*-value = 0.104, respectively). Contrary to the results in Table 3.12, we also find positive and significant coefficients on *THAV_PBT* + *UNLISTED*THAV_PBT*. The estimated coefficient on this term in Model (2) is 3.390 (*p*-value = 0.077) and in Model (4) is 3.120 (*p*-value = 0.065), both of which are greater in magnitude than the coefficients for listed firms. Hence, these results suggest that the positive association between tax haven involvement and geographic segment aggregation is stronger for unlisted relative to listed EU banks.

Some EU banks do not disclose any pre-tax profit/loss in tax havens during the sample period while others do so only in certain years. That is, *THAV_PBT* = 0 for 72 firm-year observations (32% of all firm-year observations). If firms aggregate geographic segments in the segment reporting note to obfuscate tax haven involvement, then we would expect the positive association found in Tables 3.12 and 3.13 to be stronger for firms who disclose pre-tax profit/loss in tax havens. Therefore, we re-estimate Equations (3) and (4) conditional upon the firm disclosing pre-tax profit/loss in a tax haven (i.e., when *THAV_PBT* $\neq$ 0). The results are presented in Table 3.14. In line with our expectations, the estimated coefficient on *THAV_PBT* in Models (1) and (3) in both panels is greater than the corresponding coefficient reported in Tables 3.12 and 3.13. However, the results change depending on listing status. Specifically, the estimated coefficient on *THAV_PBT* in Models (2) and (4) of both panels is smaller than in Tables 3.12 and 3.13 and loses statistical significance, whereas the coefficient on *THAV_PBT* + *UNLISTED*THAV_PBT* is larger than those in Tables 3.12 and 3.13 and statistical significance increases. Thus, these results suggest that, conditional upon the firm disclosing a pre-tax profit/loss in a tax haven, the positive association between tax haven involvement and geographic segment aggregation is stronger for unlisted relative to listed EU banks.

Similarly, we expect the positive association between tax haven involvement and geographic segment aggregation to be greater for firms who have a higher intensity of tax haven use relative to those who have a lower intensity of use. Accordingly, we partition the sample into two groups, firms with a tax haven intensity above the annual median and firms with a tax haven intensity equal to or below the annual median. We re-estimate Equation (3) and present the results in Table 3.15. The results confirm our expectation. Specifically, the estimated coefficient on *THAV_PBT* in all four models

for firms with an above median level of *THAV_PBT* are positive with three of the four coefficients significant at the 5% level. The coefficient of 1.335 in Model (1) of Panel A is mildly significant (*p*-value = 0.105). Conversely, all estimated coefficients on *THAV_PBT* for firms with below median tax haven intensity are negative and statistically insignificant.

Overall, the evidence presented in Tables 3.12 - 3.15 supports the rejection of H2.

3.6 Additional analysis

This section investigates several anomalies uncovered during the study regarding compliance with both the CBCR and IFRS 8 requirements.

3.6.1 Analysis of 'Other' category used in CBCRs

Article 89 (Para. 1) of Directive 2013/36/EU requires each firm to publish the disclosure items (e.g., turnover, profit, employees) *by Member State and by third country* in which it has an establishment. Despite this, 25 EU banks (84 firm-year observations) provide an incomplete picture of their geographic footprint in their CBCR by aggregating several countries in a category called 'Other' for at least one disclosure item.[68] However, these firms may be relying on materiality benchmarks contained in the auditing standards.[69] Indeed, two of the UK banks provide materiality guidelines they use to determine which countries are included in the 'Other' category. The first firm aggregates countries who each have less than £15m in turnover, while the second discloses that 'Other' includes countries with less than £10m in turnover in 2016 (£20m in 2015, and £50m in 2014 and 2013).[70]

[68] The results are not clustered by country. The 25 firms are headquartered in: Germany (5), Spain (4), Netherlands (3), Sweden (3), UK (3), Austria (2), Greece (2), Portugal (2), and Ireland (1). Furthermore, the 'Other' category is used consistently across years with 20, 21, 22, and 20 firm-year observations in 2013, 2014, 2015, and 2016 respectively.

[69] Paragraph 4 of Article 89 of Directive 2013/36/EU states that the information referred to in Paragraph 1 shall be audited in accordance with Directive 2006/43/EC from 1 January 2015 (i.e., the auditing requirement commences for 2014 CBCR data). Directive 2006/43/EC (17 May 2006) covers statutory audits of annual accounts and consolidated accounts. Paragraph 13 requires that 'all statutory audits be carried out on the basis of international auditing standards'. Footnote 37 discusses International Auditing Standard 320 and the IASB guidance on materiality.

[70] Across 2013-2016, €12,425m of turnover, €339m of pre-tax profit/loss, and 68,695 employees were categorised as 'Other' representing 0.47%, 0.10%, and 0.62% of total turnover, pre-tax profit/loss, and employees, respectively.

The amounts included in 'Other' for each disclosure item are compared to the total amount for that respective disclosure item and the results are presented in Panel A of Table 3.16. Overall, the mean (median) of 'Other' as a proportion of the total is -2.2% (0.4%). This lends support to the use of the 'Other' category based on materiality. However, in untabulated results, we find that the value of 'Other' exceeded the value of the amount for the smallest stand-alone country in 52.4% of firm-year-disclosure item observations.[71] Furthermore, some firms reveal the countries constituting the 'Other' category. A total of 42 countries were disclosed equating to 108 country observations. Panel B of Table 3.16 presents the countries disclosed most often. Luxembourg, a popular tax haven, is the country most often included in 'Other'. Other tax havens aggregated in 'Other' include the British Virgin Islands, Cayman Islands, Netherlands, Switzerland, and Hong Kong.[72]

Since tax havens are often aggregated in 'Other', one may expect that firms utilising this generic category may be attempting to conceal their level of tax haven involvement. However, these firms do not appear to differ from other sample firms regarding tax haven intensity. Panel C of Table 3.14 reports the differences in means and medians of the variables measuring tax haven intensity for those firms using 'Other' and those that do not. Interestingly, firms that use a 'Other' category have a statistically significant *lower* presence in tax havens in terms of turnover. The difference in mean (median) of *THAV_TO* is -0.008 (-0.011) significant at the 5% (1%) level. Yet, the difference between intensity of tax haven use when measured using profit before tax or entities is statistically insignificant. Overall, these results reveal that EU banks disclose tax haven activity in a 'Other' category in their CBCR but that they may do so for reasons other than to obfuscate tax haven involvement.

3.6.2 Material countries in CBCRs not disclosed in geographic segment reporting

One challenge in assessing the possibility firms withhold disclosure of geographic information required by IFRS 8, is that we only observe what has been disclosed in financial statements. What *should* have been disclosed is generally unobservable.

[71] Only country values greater than zero are counted (some are negative e.g., a pre-tax loss is reported).
[72] The remaining countries included in 'Other' disclosed by firms (untabulated) include Cyprus, Gibraltar, Liberia, Panama, and the Channel Islands (all tax havens).

However, public CBCR helps overcome this obstacle by providing an alternative source of geographic disclosure that can be used to evaluate whether geographic disclosures made in the segment reporting note are complete.[73]

Utilising the newly available CBCR data, we first apply the materiality thresholds described in Section 3.3.2 to CBCR disclosures and discover several instances where countries deemed material are *not* disclosed as stand-alone geographic segments in the segment reporting note or as countries within entity-wide disclosures. The five most prevalent non-disclosed countries at the 10% (5%) materiality threshold are the US, UK, Luxembourg, Italy, and Austria (US, UK, Luxembourg, Italy, and Germany).[74] Interestingly, Luxembourg ranks as the third most common material country not to be disclosed as a distinct geographic segment using either materiality threshold.[75] Next, we calculate the annual firm-level ratio of the number of country geographic segments in the segment reporting note to the number of material countries extracted from the CBCR. The mean ratio at the 10% materiality level is 1.02 which suggests geographic disaggregation at the segment reporting level broadly aligns with CBCR country-level information. However, at the 5% materiality level, the mean ratio is 0.63, consistent with higher geographic aggregation at the segment reporting level.

While these findings are prima facie evidence of potential non-compliance with IFRS 8, several mitigating factors require consideration. First, IFRS 8 does not define 'material' nor does it provide clear guidance on this matter allowing discretion over what geographic segments are disclosed. Second, IFRS 8 does not require disclosure of any geographic information if it is not prepared for internal use. Third, and more importantly, IFRS 8.19 posits that there may be a practical limit to the number of reportable segments an entity separately discloses beyond which segment information may become too detailed. It states that while no precise limit has been determined, as the number of reportable segments increases above 10, the entity should consider

[73] Dyreng et al. (2018) compare private Internal Revenue Service data to public disclosures of foreign subsidiary locations of US MNCs to explore whether firms fail to publicly disclose subsidiaries in some countries, even when the subsidiaries are significant and should be disclosed per Security and Exchange Commission rules. They find that the propensity to omit significant subsidiaries is especially strong when subsidiaries are in tax havens.

[74] At the 10% (5%) materiality threshold we find 37 (62) firm-year observations for the US, 34 (56) for the UK, 22 (42) for Luxembourg, 18 (23) for Italy, 12 (13) for Austria, and 6 (21) for Germany.

[75] Other material countries identified at the 5% level not reported as separate geographic segments include the following tax havens (firm-years): Ireland (13), Singapore (8), Channel Islands (7), Netherlands (7), Mauritius (5), Switzerland (5), Hong Kong (4), Cayman Islands (3), and Cyprus (3).

whether a practical limit has been reached. Finally, a potential concern with the preceding ratio is that it fails to account for 'mismatched' countries. Mismatched countries are countries disclosed as a stand-alone geographic segment in the segment reporting note despite *not* being identified as a material country in the CBCR.[76]

3.6.3 Non-disclosure of home country geographic segment or entity-wide disclosures

As discussed in Section 3.2.1.1, IFRS 8 mandates entity-wide disclosures of revenues and non-current assets for the firm's home country and foreign countries (in total) irrespective of the basis used to identify operating segments. If an individual foreign country is 'material', then country-level disclosure is required. Surprisingly, in 22.9% of firm-years (80 firm-years relating to 20 sample firms) the country of domicile is *not* disclosed as a stand-alone geographic segment or as a stand-alone country within entity-wide disclosures. Only 2 of the non-disclosing firms define their segments according to geography meaning the remaining 18 non-disclosing firms should, prima facie, provide entity-wide disclosures. However, of the 18 non-disclosing firms, 7 firms do not provide any entity-wide disclosures nor any explanation as to why not, while another 6 firms state that the immateriality of foreign operations validates the non-provision of entity-wide disclosures. The remaining 5 firms only disclose aggregated (non-country level) geographic segments. This evidence highlights potential non-compliance with IFRS 8 although a caveat is that IFRS 8 does not require any geographic information to be disclosed as entity-wide disclosures if preparation costs are deemed excessive by the firm.

Overall, the seemingly inconsistent disclosures for geographic segment reporting purposes discussed in this section and the preceding section, is puzzling. On the one hand, the irregularities identified could indicate instances of possible non-compliance with IFRS 8 requirements. On the other hand, they may simply be the outcome of

[76] For example, in each year of the sample period, Credit Agricole Group discloses information for Japan despite the corresponding CBCR showing that at no stage Japan accounts for more 1.9% of total turnover or pre-tax profits. In aggregate, at the 10% materiality level, 78 firm-years are identified where there is at least one country mismatch, though this decreases to 54 firm-years when the 5% materiality level is applied. Interestingly, tax havens account for 28 of the 54 firm-years meaning some firms disclose these jurisdictions in their segment reporting note despite them being labelled as tax havens and not meeting materiality benchmarks. The mismatched tax havens are (observations): Luxembourg (9), Latvia (5), Ireland (4), Netherlands (4), Cyprus (3), Singapore (2), and Switzerland (1).

compliant strategic disclosure decisions taken by firms. Indeed, IFRS 8 affords managers discretion to define and report information about operating segments to best align external reporting with the firm's internal organisation. Moreover, unless disclosed by the firm, reasons for the inclusion or omission of certain countries from geographic segment reporting is unobservable.

3.7 Robustness tests

3.7.1 Alternative measures of geographic segment aggregation

We follow Akamah et al. (2018) and employ alternative geographic segment aggregation measures that do not rely upon materiality thresholds. Specifically, we re-estimate Equations (3) and (4) using versions of *NOMATCH* and *LEVEL* based upon the disclosure of turnover or entities in the CBCR. First, we match countries in the CBCR where turnover or entities are disclosed to their related geographic title in the segment reporting note. *NOMATCH* is the proportion of countries in the CBCR not disclosed as stand-alone countries in geographic segment disclosures. Using the example in Appendix A, only 2 of 36 countries where turnover is reported in the CBCR (UK and US) can be matched to geographic segment disclosures in the segment note. Thus, *NOMATCH_TO* equals 0.944 (34/36). In untabulated aggregate results, when *NOMATCH_TO* (*NOMATCH_ENT*) is the dependent variable, the estimated coefficient on *THAV_PBT* is 0.302 (0.181) with a *p*-value of 0.113 (0.124).

Second, *LEVEL* is the average aggregation score of all countries in the CBCR. Again, we employ two versions of *LEVEL*, one each using turnover and entities. For the example in Appendix A, *LEVEL_TO* equals 1.903 (the total aggregation score of 68.5 divided by 36 countries where turnover is reported).[77] We also employ a weighted measure of *LEVEL* (*LEVEL_WT*) that weights each country's aggregation score by the proportion of its turnover or entities to total turnover or entities. This ensures that the aggregation level of larger countries in terms of relative turnover and entities is more heavily weighted in the firm's overall aggregation score. When *LEVEL_TO*, *LEVEL_ENT*, *LEVEL_TO_WT*, or *LEVEL_ENT_WT* are the dependent variable, we find significant positive coefficients on the variables of interest in the

[77] The aggregation score is calculated in accordance with the scale provided in Appendix C.

majority of the models estimated consistent with the results in Section 3.5.3. Overall, our inferences remain unchanged when we use these alternative measures of geographic segment aggregation.

3.7.2 Alternative measures of tax haven intensity

Prior studies of firm involvement in tax havens (e.g., Dyreng et al. 2016; Akamah et al. 2018) rely upon proxies based on the percentage of material subsidiaries located in tax havens. CBCR disclosures include data on the number and location of all firm entities (subsidiaries and branches). Hence, we replace *THAV_PBT* with *THAV_ENT* calculated as the ratio of entities disclosed in tax haven countries to total entities. We re-estimate Equations (3) and (4) and report the results in Tables 3.17, 3.18, and 3.19. The results support the primary findings in Section 3.5.3. In additional tests (untabulated), we employ *THAV_TO* as the tax haven intensity variable, based on turnover disclosed in CBCRs. Inferences remain unchanged when using this proxy.

3.7.3 Alternative list of tax havens

In the primary analysis, we rely on the list of smaller 'dot' tax havens (List 1). We re-run the analysis defining tax havens per List 2. We expect the results to differ from the those found in the primary analysis due to EU banks having substantial operations in several of these larger tax havens (e.g., Hong Kong, Ireland, Netherlands, Singapore, and Switzerland) and often disclosing them as stand-alone countries in their segment reporting note. In line with our expectations, we fail to find an association between intensity of tax haven involvement and geographic segment aggregation. This result is consistent with EU banks not attempting to obfuscate operations in larger tax havens that offer benefits over and above tax minimisation.

3.7.4 Changes analysis

Despite the models including controls found in prior studies to be determinants of variation in levels of segment disclosure and tax haven use, concerns remain that we have not controlled for unobservable firm characteristics. To mitigate concerns regarding correlated omitted variables, we re-estimate Equations (3) and (4) in first differences (Stock and Watson 2012). However, the feasibility of the changes specifications is reduced because our small sample size likely impacts the power of

our empirical tests to detect an association. In untabulated results, we find insignificant coefficients on Δ*THAV_PBT* and Δ*THAV_ENT* when both versions of Δ*NOMATCH_MAT* and Δ*LEVEL_MAT* are the dependent variables (e.g., the estimated coefficient on Δ*THAV_PBT* is 0.321 with a *p*-value of 0.209 when Δ*NOMATCH_MAT_10* is the dependent variable). However, the coefficient on Δ*THAV_TO* is 2.700 (4.142) with a *p*-value of 0.046 (0.075) when Δ*NOMATCH_MAT_10* (Δ*LEVEL_MAT_10*) is the dependent variable.

3.8 Conclusion

This study examines a unique aspect of the EU institutional setting where, since 2013, EU banks are required to provide two different forms of geographic reporting for the same period. CBCR emanates from an EU Directive imposed on these firms while segment reporting is required by firms preparing their consolidated financial statements in accordance with IFRS. Accordingly, we investigate several issues regarding the potential interplay between the two disclosure requirements. First, our hand-collected CBCR data provides deeper insight into the location of EU banks' businesses including the extent to which they operate in tax havens. We document that, on average, EU banks with tax haven operations enjoy significantly *higher* profit margins, turnover per employee, and profit per employee, and *lower* effective tax rates, relative to non-tax havens. These findings are consistent with the results of prior studies that show firms obtain financial benefits from operating in tax havens.

We do not find any evidence of a change in the number of geographic segments, country segments, or number of line items per geographic segment, reported in segment notes after the introduction of CBCR. These results are corroborated when we compare EU banks to EU insurers in a difference-in-differences research design. Overall, these results suggest CBCR has had little impact on geographic segment reporting. Exploiting the granularity of the CBCR data, we apply materiality thresholds to identify material countries more likely to be disclosed as stand-alone geographic segments in the segment reporting note. We then employ several aggregation measures and test the relationship between the intensity of tax haven involvement and geographic segment aggregation. Consistent with the results of Akamah et al. (2018), we find evidence of a positive association, suggesting that EU banks operating in tax havens strategically aggregate geographic segments potentially

to obfuscate tax haven involvement. The final part of our study, although primarily descriptive, provides insights into several irregularities uncovered regarding compliance with CBCR requirements and IFRS 8.

Our findings are subject to several caveats. First, CBCR has been in force for a relatively short period, so this study provides early empirical evidence. Second, our study is restricted to one industry and therefore our sample is not representative of the population of firms operating in the EU. Third, our sample size is relatively small, so we may lack statistical power to detect some effects. Finally, although we exploit an exogenous shock to EU banks, we have been unable to provide convincing evidence to allay concerns regarding endogeneity and omitted correlated variables. Nevertheless, understanding the interplay between different forms of geographic reporting is informative to policy makers and standard setters.

3.9 Tables and figures

Table 3.1: Sample selection procedure

This table reports an overview of the sample selection process. Panel A outlines the sample selection procedure for the main sample of EU banks. Panel B outlines the sample selection procedure for the control sample of EU insurers.

Panel A: EU banks

Selection criteria	Firms
European Banking Authority (EBA) List of Institutions for Supervisory Reporting as at January 2016	198
Less: Firms from Norway not subject to CBCR disclosure rules	(3)
Less: Subsidiaries of firms headquartered in other EU countries to avoid double-counting e.g., HSBC appears in France and Malta despite it being a UK headquartered firm	(49)
Less: Subsidiaries of firms headquartered in non-EU countries for which consolidated IFRS financial statements are not available e.g., Goldman Sachs Group UK Limited	(22)
Less: Purely domestic firms (only operate in one country)	(36)
Less: Firms for which English language financial statements could not be obtained	(14)
Less: Firms for which no CBCR could be found	(4)
Less: Firms not collected due to small size of total assets	(7)
Less: Firms who commence or cease business during the sample period	(3)
Add: Firms for which English language consolidated IFRS financial statement and CBCRs were readily found during the data collection process i.e., BKS Bank, BTV, CIC, Credit Agricole SA, Credit Suisse International Limited, Investec Bank, Natixis, Oberbank, Van Lanschot, Wustenrot & Wurttembergische	10
Final sample	70

Table 3.1: Sample selection procedure (continued)

This table reports an overview of the sample selection process. Panel A outlines the sample selection procedure for the main sample of EU banks. Panel B outlines the sample selection procedure for the control sample of EU insurers.

Panel B: EU insurers

Selection criteria	Firms
European Insurance and Occupational Pensions Authority (EIOPA) List of Identified Insurance Groups for Supervision as at November 2015	102
EU insurers downloaded from Datastream for the same 14 countries as the EU bank sample	106
	208
Less: Firms included in both lists	(27)
Less: Firms not reporting in all years due to business commencement, acquisition, or merger during the sample period	(52)
Less: Firms from EU countries not included in the primary sample of EU banks e.g., Finland, Poland	(6)
Less: Firms who are subsidiaries of EU banks	(23)
Less: Firms whose financial statements are not prepared in accordance with IFRS accounting standards	(23)
Less: Firms for which English language financial statements could not be obtained	(9)
Less: Firms from non-EU countries e.g., Norway, Switzerland, Bermuda (XL Group switched its domicile from Ireland to Bermuda during the sample period)	(8)
Less: Purely domestic firms (only operate in one country)	(6)
Less: Firms with missing data to calculate variables	(15)
Final sample	39

Table 3.2: Primary sample composition – EU banks

This table presents an overview of the primary sample. Panel A lists the firms in alphabetical order (with the 14 GSIBs listed first). Total assets are measured as at the end of the 2016 fiscal year (31 December 2016 for all firms except Investec Bank and Nationwide Building Society which have 31 March and 4 April year-ends respectively). Total assets reported in local currency are converted to Euros using the foreign exchange rate as at fiscal year-end. Panel B presents the sample composition by country. Panel C presents the split of total assets for the 2016 fiscal year by firm type.

Panel A: Primary sample composition by firm – EU banks

	Firm	Country	GSIB	Listed	Total Assets (€m)
1	Barclays	UK	Yes	Yes	1,421,746
2	BBVA	Spain	Yes*	Yes	731,856
3	BNP Paribas	France	Yes	Yes	2,076,959
4	Credit Agricole Group	France	Yes	No	1,722,849
5	Deutsche Bank	Germany	Yes	Yes	1,590,546
6	Groupe BPCE	France	Yes	No	1,235,240
7	HSBC	UK	Yes	Yes	2,257,345
8	ING Bank	Netherlands	Yes	No	843,919
9	Nordea	Sweden	Yes	Yes	613,778
10	Royal Bank of Scotland	UK	Yes	Yes	936,000
11	Santander	Spain	Yes	Yes	1,339,125
12	Societe Generale	France	Yes	Yes	1,382,241
13	Standard Chartered	UK	Yes	Yes	614,659
14	UniCredit	Italy	Yes	Yes	859,533
15	ABN AMRO	Netherlands	No	Yes	394,482
16	Allied Irish Banks	Ireland	No	Yes	95,622
17	Alpha Bank	Greece	No	Yes	64,872
18	Argenta Spaarbank	Belgium	No	No	36,156
19	Banca Monte dei Paschi di	Italy	No	Yes	153,178
20	Banco BPI Group	Portugal	No	Yes	38,727
21	Banco Comercial Portugues	Portugal	No	Yes	71,265
22	Banco Popolare Group	Italy	No	Yes	117,411
23	Banco Popolare Espanol	Spain	No	Yes	147,926
24	Banco Sabadell	Spain	No	Yes	212,508
25	Bank fur Tirol und Vorarlberg	Austria	No	Yes	10,014
26	Bank of Cyprus	Cyprus	No	Yes	22,172
27	Bank of Ireland	Ireland	No	Yes	123,129
28	Bankia SA	Spain	No	Yes	190,167
29	Bankinter	Spain	No	Yes	67,182
30	Bayerische Landesbank	Germany	No	No	212,150
31	Belfius Bank	Belgium	No	No	176,721
32	BKS Bank	Austria	No	Yes	7,581

*BBVA was classified as a GSIB for all years in the sample period except 2016.

Table 3.2: Primary sample composition (continued)

Panel A: Primary sample composition by firm – EU banks (continued)

	Firm	Country	GSIB	Listed	Total Assets (€m)
33	CaixaBank Group	Spain	No	Yes	347,927
34	Caixa Geral de Depositos	Portugal	No	No	93,547
35	CIC	France	No	Yes	269,316
36	Commerzbank	Germany	No	Yes	480,450
37	Credit Agricole SA	France	No	Yes	1,524,232
38	Credit Mutuel Group	France	No	No	793,522
39	Credit Suisse International	UK	No	No	315,875
40	Danske Bank	Denmark	No	Yes	468,515
41	DekaBank	Germany	No	No	85,955
42	DZ Bank	Germany	No	No	509,447
43	Erste Group	Austria	No	Yes	208,227
44	Eurobank Ergasis	Greece	No	Yes	66,393
45	Gruppo UBI Banca	Italy	No	Yes	112,384
46	HSH Nordbank	Germany	No	No	84,365
47	Intesa Sanpaolo	Italy	No	Yes	725,100
48	Investec Bank	UK	No	No	21,537
49	Jyske Bank	Denmark	No	Yes	78,905
50	KBC Bank	Belgium	No	No	239,333
51	La Banque Postale	France	No	No	229,577
52	Landesbank Baden-Wurttemberg	Germany	No	No	243,620
53	Landesbank Hessen-Thuringen	Germany	No	No	165,164
54	Lloyds Banking Group	UK	No	Yes	958,428
55	National Bank of Greece	Greece	No	Yes	78,531
56	Nationwide Building Society	UK	No	No	258,567
57	Natixis	France	No	Yes	527,859
58	NORD/LB Norddeutsche	Germany	No	No	174,797
59	Nykredit Realkredit Group	Denmark	No	No	188,366
60	Oberbank	Austria	No	Yes	19,159
61	Piraeus Bank Group	Greece	No	Yes	81,501
62	Rabobank	Netherlands	No	No	662,593
63	Raiffeisen Bank International	Austria	No	Yes	111,864
64	Skandinaviska Enkilda Banken	Sweden	No	Yes	273,462
65	Svenska Handelsbanken	Sweden	No	Yes	274,185
66	Swedbank	Sweden	No	Yes	224,789
67	Sydbank	Denmark	No	Yes	19,728
68	Van Lanschot	Netherlands	No	Yes	14,877
69	Volkswagen Financial Services	Germany	No	No	130,148
70	Wustenrot & Wurttembergische	Germany	No	Yes	72,276
					30,901,581

Table 3.2: Primary sample composition (continued)

Panel B: Primary sample composition by country – EU banks

Country	Firms	%	GSIBs	%	Listed	%	Total Assets (€m)	%
Austria	5	7.1%	0	0.0%	5	10.4%	356,844	1.2%
Belgium	3	4.3%	0	0.0%	0	0.0%	452,210	1.5%
Cyprus	1	1.5%	0	0.0%	1	2.1%	22,172	0.1%
Denmark	4	5.7%	0	0.0%	3	6.3%	755,514	2.4%
France	9	12.9%	4	28.6%	5	10.4%	9,761,795	31.6%
Germany	11	15.7%	1	7.1%	3	6.3%	3,748,917	12.1%
Greece	4	5.7%	0	0.0%	4	8.3%	291,297	0.9%
Ireland	2	2.9%	0	0.0%	2	4.2%	218,751	0.7%
Italy	5	7.1%	1	7.1%	5	10.4%	1,967,606	6.4%
Netherlands	4	5.7%	1	7.1%	2	4.2%	1,915,871	6.2%
Portugal	3	4.3%	0	0.0%	2	4.2%	203,540	0.7%
Spain	7	10.0%	2	14.3%	7	14.6%	3,036,692	9.8%
Sweden	4	5.7%	1	7.1%	4	8.3%	1,386,214	4.5%
UK	8	11.4%	4	28.6%	5	10.4%	6,784,158	21.9%
Total	70	100.0%	14	100.0%	48	100.0%	30,901,581	100.0%

Panel C: Total assets by firm type – EU banks (2016 fiscal year)

Firm type	Mean (€m)	Median (€m)	Min (€m)	Max (€m)
GSIB	1,258,985	1,287,183	613,778	2,257,345
Non-GSIB	237,068	159,171	7,581	1,524,232
Listed	468,294	210,367	7,581	2,257,345
Unlisted	382,884	220,864	21,537	1,772,849
All firms	441,451	212,329	7,581	2,257,345

Table 3.3: Control sample composition – EU insurers

This table presents an overview of the control sample. Panel A lists the firms in alphabetical order. Total assets are measured as at the end of the 2016 fiscal year (31 December 2016 for all firms). Total assets reported in local currency are converted to Euros using the foreign exchange at fiscal year end. Panel B presents the sample composition by country. Panel C presents the split of total assets by firm type.

Panel A: Control sample composition by firm - EU insurers

	Firm	Country	Listed	Total Assets (€m)
1	Achmea	Netherlands	N	91,015
2	ACHP	UK	Y	28
3	Admiral Group	UK	Y	4,367
4	Aegon	Netherlands	Y	414,640
5	Ageas	Belgium	Y	103,459
6	Allianz	Germany	Y	864,489
7	Amlin	UK	Y	11,615
8	APRIL	France	Y	1,420
9	Assicurazioni Generali	Italy	Y	513,611
10	Aviva	UK	Y	506,784
11	AXA	France	Y	876,378
12	Beazley	UK	Y	5,622
13	BUPA	UK	N	15,833
14	Cattolica Ass	Italy	Y	22,987
15	Chesnara	UK	Y	6,799
16	CNP Assurances	France	Y	395,081
17	Delta Lloyd	Netherlands	Y	75,401
18	Euler Hermes	France	Y	5,180
19	Groupama	France	N	90,484
20	Grupo Catalana	Spain	Y	12,921
21	Hannover Re	Germany	Y	60,277
22	Jardine Lloyd Thompson	UK	Y	2,994
23	Legal & General	UK	Y	542,039
24	MAPFRE	Spain	Y	63,612
25	Munich Re	Germany	Y	256,336
26	Novae Group	UK	Y	2,323
27	Old Mutual	UK	Y	197,309
28	Phoenix Group	UK	Y	96,150
29	Prudential	UK	Y	546,352
30	RSA Insurance Group	UK	Y	21,819
31	SCOR	France	Y	41,248
32	St James's Place	UK	Y	87,595
33	Standard Life	UK	Y	216,893
34	Talanx	Germany	Y	148,036
35	Tryg	Denmark	Y	6,432

Table 3.3: Control sample composition – EU insurers (continued)

Panel A: Control sample composition by firm - EU insurers (continued)

	Firm	Country	Listed	Total Assets (€m)
36	Unipol Gruppo	Italy	Y	89,911
37	UNIQA Insurance	Austria	Y	32,990
38	Vienna Insurance	Austria	Y	48,885
39	Vittoria Assicurazioni	Italy	Y	3,582
				6,484,878

Panel B: Control sample composition by country – EU insurers

Country	Firms	%	Listed	%	Total Assets (€m)	%
Austria	2	5.1%	2	5.6%	81,875	1.3%
Belgium	1	2.6%	1	2.8%	103,459	1.6%
Denmark	1	2.6%	1	2.8%	6,432	0.1%
France	6	15.3%	5	13.8%	1,409,791	21.7%
Germany	4	10.3%	4	11.1%	1,329,138	20.5%
Italy	4	10.3%	4	11.1%	630,091	9.7%
Netherlands	3	7.7%	2	5.6%	583,056	9.0%
Spain	2	5.1%	2	5.6%	76,533	1.2%
UK	16	41.0%	15	41.6%	2,264,502	34.9%
Total	39	100.0%	36	100.0%	6,484,878	100.0%

Panel C: Total assets by firm type – EU insurers (2016 fiscal year)

Firm type	Mean (€m)	Median (€m)	Min (€m)	Max (€m)
All firms	166,279	63,612	28	876,378

Table 3.4: Summary statistics

This table presents summary statistics for the variables used in the empirical analysis. The full sample comprises observations spanning 2012-2016 (2013-2016 for CBCR related variables). All continuous variables are winsorized at the 1% and 99% level. Significant differences in the means and medians are based on two-sided *t*-tests and Wilcoxon median tests, respectively. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix C.

	Full sample (109 firms)						EU Banks (70 firms)			EU Insurers (39 firms)		
	Obs.	Mean	SD	P25	P50	P75	Obs.	Mean	Median	Obs.	Mean	Median
GEO_SEG	545	0.204	0.403	0.000	0.000	0.000	350	0.160	0.000	195	0.282***	0.000***
NUM_GEO_SEG	545	4.404	3.636	2.000	4.000	7.000	350	4.037	4.000	195	5.062***	4.000
NUM_CTRY_SEG	545	2.319	2.954	1.000	1.000	3.000	350	1.994	1.000	195	2.903***	2.000*
NUMITEMS_GEO_SEG	545	14.202	19.004	1.000	5.000	23.000	350	11.863	3.000	195	18.400***	8.000**
NOMATCH_MAT_10	261	0.374	0.415	0.000	0.000	0.750	261	0.374	0.415	-	-	-
NOMATCH_MAT_5	261	0.481	0.398	0.000	0.500	0.830	261	0.481	0.398	-	-	-
LEVEL_MAT_10	261	1.082	1.488	0.000	0.000	1.417	261	1.082	1.488	-	-	-
LEVEL_MAT_5	261	1.296	1.434	0.000	0.750	1.833	261	1.296	1.434	-	-	-
THAV_PBT	222	0.043	0.123	0.000	0.001	0.045	222	0.043	0.123	-	-	-
THAV_TO	261	0.020	0.031	0.000	0.007	0.030	261	0.020	0.031	-	-	-
THAV_ENT	280	0.102	0.114	0.031	0.062	0.134	280	0.102	0.114	-	-	-

Table 3.4: Summary statistics (continued)

This table presents summary statistics for the variables used in the empirical analysis. The full sample comprises observations spanning 2012-2016 (2013-2016 for CBCR related variables). All continuous variables are winsorized at the 1% and 99% level. Significant differences in the means and medians are based on two-sided *t*-tests and Wilcoxon median tests, respectively. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix C.

	Full sample (109 firms)						EU Banks (70 firms)			EU Insurers (39 firms)		
	Obs.	Mean	SD	P25	P50	P75	Obs.	Mean	Median	Obs.	Mean	Median
UNLISTED	545	0.229	0.421	0.000	0.000	0.000	350	0.314	0.000	195	0.077***	0.000***
SIZE	545	18.597	1.748	17.612	18.847	19.885	350	19.180	19.176	195	17.550***	17.899***
ROA	545	0.009	0.019	0.002	0.005	0.009	350	0.002	0.004	195	0.021***	0.010***
LEV	545	0.910	0.083	0.905	0.937	0.954	350	0.936	0.942	195	0.863***	0.909***
INTANG	545	0.018	0.040	0.002	0.006	0.016	350	0.006	0.004	195	0.040***	0.018***
CAPINT	545	0.010	0.022	0.002	0.005	0.010	350	0.006	0.005	195	0.017***	0.007*
REVGRTH	545	0.018	0.299	-0.086	-0.021	0.048	350	-0.038	-0.042	195	0.118***	0.031***
ΔTLCF	545	-0.000	0.001	-0.000	-0.000	0.000	350	-0.000	-0.000	195	-0.000*	-0.000
TLCF_DUM	545	0.851	0.356	1.000	1.000	1.000	350	0.863	1.000	195	0.831	1.000
NUM_CTRY_ENT	545	21.457	19.331	7.000	14.000	34.000	350	20.183	12.000	195	23.744**	18.000*

Table 3.5: Correlations matrix

This table presents the correlations between the variables used in the empirical analysis. Panel A (Panel B) presents the results for the full sample (EU banks only). Pearson (Spearman) correlation coefficients are shown below (above) the diagonal. Significant (*p*-value < 0.05) coefficients are reported in bold. All variables are defined in Appendix C.

Panel A: Full sample (Changes in segment reporting tests)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	NUM_GEO_SEG		**0.777**	**0.465**	-0.032	**0.280**	**0.132**	**-0.095**	0.064	**0.557**
(2)	NUM_CTRY_SEG	**0.840**		**0.508**	-0.049	0.069	**0.114**	**-0.101**	-0.007	**0.204**
(3)	NUMITEMS_GEO_SEG	**0.256**	**0.243**		-0.003	-0.012	**0.116**	**-0.130**	0.019	**0.248**
(4)	POST	-0.011	-0.007	0.019		0.006	**0.114**	**-0.131**	-0.046	-0.011
(5)	SIZE	**0.197**	0.070	0.002	0.012		**-0.375**	**0.572**	-0.069	**0.529**
(6)	ROA	0.084	0.003	0.025	0.028	**-0.517**		**-0.503**	**0.349**	0.058
(7)	LEV	-0.076	0.015	-0.045	-0.045	**0.642**	**-0.657**		**-0.105**	-0.003
(8	REVGRTH	-0.081	-0.063	-0.012	-0.038	-0.030	**0.093**	0.053		**0.130**
(9)	NUM_CTRY_ENT	**0.432**	**0.142**	0.036	-0.009	**0.464**	**0.094**	-0.027	-0.006	

Table 3.5: Correlations matrix (continued)

This table presents the correlations between the variables used in the empirical analysis. Panel A (Panel B) presents the results for the full sample (EU banks only). Pearson (Spearman) correlation coefficients are shown below (above) the diagonal. Significant (*p*-value < 0.05) coefficients are reported in bold. All variables are defined in Appendix C.

Panel B: EU banks only (Geographic segment aggregation tests)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1)	NOMATCH_MAT_10		**0.921**	**0.976**	**0.870**	0.124	0.104	0.048	**-0.180**	-0.053	0.041	**0.201**	0.024	0.036	-0.082	0.076
(2)	NOMATCH_MAT_5	**0.888**		**0.896**	**0.959**	**0.154**	**0.163**	0.113	**-0.218**	-0.029	0.050	**0.244**	0.058	0.013	-0.041	**0.142**
(3)	LEVEL_MAT_10	**0.900**	**0.792**		**0.890**	0.095	0.095	-0.003	**-0.196**	-0.085	0.032	**0.224**	0.015	0.030	-0.093	0.014
(4)	LEVEL_MAT_5	**0.854**	**0.865**	**0.956**		0.121	**0.167**	0.047	**-0.228**	-0.051	0.007	**0.249**	0.034	-0.009	-0.050	0.065
(5)	THAV_PBT	**0.217**	**0.213**	0.127	0.126		**0.151**	**0.408**	0.071	**0.279**	0.120	**-0.201**	0.102	0.052	0.062	**0.366**
(6)	UNLISTED	0.101	**0.187**	0.118	**0.176**	0.097		0.016	0.019	**0.300**	**-0.311**	**-0.342**	0.064	0.034	**-0.136**	-0.081
(7)	SIZE	0.009	**0.141**	**-0.200**	**-0.156**	**0.184**	0.046		-0.114	**0.413**	**0.406**	**-0.170**	**0.164**	-0.019	**0.223**	**0.741**
(8)	ROA	-0.035	-0.082	-0.063	-0.092	0.023	**0.136**	0.040		**-0.185**	-0.070	**-0.155**	**0.256**	-0.063	**-0.150**	**-0.160**
(9)	LEV	-0.094	-0.073	-0.121	-0.121	0.128	**0.244**	**0.361**	**-0.128**		**-0.234**	**-0.511**	0.067	0.095	-0.116	0.114
(10)	INTANG	0.090	**0.127**	0.056	0.057	-0.033	**-0.260**	**0.219**	-0.067	**-0.216**		**0.180**	0.068	-0.044	**-0.184**	**0.395**
(11)	CAPINT	**0.202**	**0.218**	**0.232**	**0.239**	**-0.157**	**-0.368**	**-0.216**	**-0.220**	**-0.343**	**0.198**		-0.092	-0.073	**0.153**	0.102
(12)	REVGRTH	0.040	0.070	0.005	0.011	-0.053	-0.049	0.088	**0.224**	0.050	0.071	0.011		**0.178**	-0.051	0.129
(13)	ΔTLCF	-0.015	-0.014	0.001	-0.009	-0.022	-0.061	-0.051	**-0.340**	-0.010	0.092	**0.137**	0.077		**-0.219**	-0.027
(14)	TLCF_DUM	-0.102	-0.018	**-0.220**	**-0.177**	0.071	-0.088	**0.281**	**-0.133**	-0.050	**0.176**	0.104	-0.087	-0.083		**0.444**
(15)	NUM_CTRY_ENT	0.105	**0.220**	**-0.156**	-0.115	**0.208**	-0.101	**0.734**	0.068	**0.112**	**0.236**	0.050	**0.136**	-0.057	**0.320**	

Table 3.6: Country-level profit shifting indicators calculated from CBCR data

This table presents a summary of key profit shifting indicators calculated from CBCR data. Panel A presents the results for the top 30 countries ranked by frequency of firm-year-country observations of turnover or profit/loss before tax while Panel B presents the results for the remaining tax havens. Panel C presents overall totals. EU denotes those countries who are members of the European Union while TH_L1 (TH_L2) denotes tax havens included on List 1 (List 2). Tax havens have been shaded in grey. †Channel Islands includes Guernsey and Jersey.

Panel A: Top 30 countries disclosed in CBCRs

Country	Rank	Freq	EU	TH_L1	TH_L2	Employees		Entities		Profit margin		Turnover per employee (€m)		Profit per employee (€m)	
						Mean	Rank	Mean	Rank	Median	Rank	Median	Rank	Median	Rank
United Kingdom	1	174	Y	N	N	7,723	3	43.9	2	0.351	67	0.572	12	0.129	25
United States	2	165	N	N	N	2,451	17	29.2	6	0.363	64	0.715	6	0.225	12
Germany	3	156	Y	N	N	4,642	7	37.2	3	0.274	104	0.333	34	0.097	37
Luxembourg	4	152	Y	Y	Y	426	88	11.1	12	0.549	19	0.501	14	0.255	11
France	5	119	Y	N	N	16,767	1	66.0	1	0.237	115	0.294	40	0.079	40
Ireland	6	118	Y	N	Y	926	57	14.3	11	0.566	14	0.606	9	0.318	7
Switzerland	7	108	N	N	Y	369	92	3.0	66	0.125	132	0.344	31	0.047	71
Singapore	8	106	N	N	Y	854	60	5.5	33	0.305	86	0.378	27	0.118	30
Spain	9	104	Y	N	N	5,941	5	25.5	7	0.250	110	0.385	25	0.072	44
Netherlands	10	101	Y	N	Y	3,538	10	17.6	9	0.437	38	0.371	28	0.134	22
Poland	10	101	Y	N	N	3,393	12	5.7	32	0.324	78	0.102	101	0.030	98
Italy	12	96	Y	N	N	8,675	2	14.3	10	0.185	125	0.275	44	0.059	62
China	13	92	N	N	N	1,409	43	2.9	69	0.403	54	0.288	42	0.125	26
Belgium	14	80	Y	N	N	2,419	20	7.1	26	0.325	77	0.324	36	0.109	31
Brazil	15	77	N	N	N	3,550	9	5.3	34	0.302	87	0.338	32	0.105	34
Czech Repub.	15	77	Y	N	N	1,856	30	6.7	28	0.425	42	0.167	63	0.074	41
Other	17	76	-	-	-	1,010	51	1.5	101	0.274	105	0.261	47	0.031	96
Austria	18	75	Y	N	N	1,579	35	33.1	4	0.326	76	0.280	43	0.069	47
Romania	19	74	Y	N	N	1,852	31	6.3	30	0.103	135	0.073	122	0.007	130
Russia	19	74	N	N	N	1,843	32	2.9	68	0.395	58	0.222	53	0.073	42
Hong Kong	21	73	N	N	Y	2,435	18	8.7	18	0.287	91	0.388	24	0.107	32
Portugal	21	73	Y	N	N	1,866	28	8.5	21	0.407	50	0.199	57	0.048	69
Channel Islands†	23	72	N	Y	Y	343	95	10.9	13	0.488	29	0.395	23	0.175	17
Australia	24	68	N	N	N	313	98	7.1	25	0.375	61	0.485	16	0.165	19
Sweden	24	68	Y	N	N	1,866	29	8.6	19	0.348	69	0.415	19	0.174	18
Japan	26	67	N	N	N	251	108	3.2	62	0.406	52	0.515	13	0.186	15
Denmark	27	61	Y	N	N	1,713	34	6.6	29	0.278	102	0.428	18	0.134	21
Hungary	28	59	Y	N	N	956	54	8.6	20	0.285	96	0.143	74	0.039	84
India	29	57	N	N	N	6,146	4	4.1	48	0.469	34	0.052	136	0.015	121
Turkey	29	57	N	N	N	3,454	11	3.1	64	0.321	80	0.111	91	0.034	90

Table 3.6: Country-level profit shifting indicators calculated from CBCR data (continued)

Panel B: Tax havens not included in the top 30 countries disclosed in CBCRs

Country*	Rank	Freq	EU	TH_L1	TH_L2	Employees		Entities		Profit margin		Turnover per employee (€m)		Profit per employee (€m)	
						Mean	Rank	Mean	Rank	Median	Rank	Median	Rank	Median	Rank
Cayman Islands	31	55	N	Y	Y	15	141	9.6	17	1.000	2	0.584	11	-0.005	136
Monaco	45	37	N	Y	Y	196	113	2.0	82	0.394	59	0.327	35	0.130	23
Latvia	48	31	Y	N	Y	551	75	1.4	109	0.214	118	0.133	80	0.033	93
Mauritius	53	27	N	Y	Y	291	102	3.3	58	0.432	39	0.117	88	0.068	48
Isle of Man	58	24	N	Y	Y	219	111	4.5	42	0.572	12	0.401	22	0.185	16
Bermuda	61	20	N	Y	Y	305	99	2.6	72	1.000	2	2.345	2	0.124	29
Cyprus	61	20	Y	Y	Y	946	56	24.0	8	0.148	129	0.218	54	-0.011	137
Malta	63	19	Y	Y	Y	444	87	4.6	41	0.963	5	0.148	70	0.053	64
Uruguay	68	16	N	N	Y	408	90	3.0	65	0.237	114	0.203	56	0.051	66
Bahamas	74	14	N	Y	Y	28	133	2.7	71	0.283	98	0.353	30	0.220	14
Bahrain	83	11	N	Y	Y	82	128	4.3	46	0.301	89	0.294	41	0.063	52
Gibraltar	83	11	N	Y	Y	365	93	2.0	83	0.285	97	0.214	55	0.073	43
Botswana	88	9	N	N	Y	147	119	1.8	94	0.313	84	0.145	72	0.068	49
Lebanon	88	9	N	N	Y	842	62	3.6	56	0.300	90	0.098	106	0.026	105
Brunei	100	7	N	Y	Y	291	103	1.9	91	0.333	75	0.084	114	0.028	101
Macau	100	7	N	Y	Y	101	124	1.0	121	0.650	8	1.122	3	0.742	2
Marshall Islands	110	4	N	Y	Y	-	-	31.2	5	1.075	1	-	-	-	-
Panama	110	4	N	N	Y	5	145	1.2	115	0.517	23	0.700	8	0.600	4
Vanuatu	110	4	N	Y	Y	115	122	2.0	83	0.400	55	0.093	109	0.036	86
Cape Verde	132	3	N	Y	Y	584	72	4.5	43	0.098	137	0.050	137	0.005	133
Maldives	132	3	N	Y	Y	27	134	-	-	0.852	6	0.748	5	0.655	3
Dutch Antilles	140	2	N	Y	Y	7	144	1.0	121	-	-	0.310	39	-	-
Liechtenstein	140	2	N	Y	Y	18	140	1.0	121	-	-	0.227	51	-	-
Seychelles	140	2	N	Y	Y	196	114	1.3	113	0.489	28	0.142	76	0.069	46
British Virgin Is.	146	1	N	Y	Y	-	-	4.4	45	1.000	2	-	-	-	-
Cook Islands	146	1	N	Y	Y	-	-	4.5	43	-	-	-	-	-	-

*Andorra, Antigua and Barbuda, Barbados, Samoa, and US Virgin Islands had a frequency of 0 (no turnover or profit/loss before tax recorded in these jurisdictions). However, some firms have entities located in these tax havens.

Table 3.6: Country-level profit shifting indicators calculated from CBCR data (continued)

Panel C: Overall totals

Totals		Freq.	Employees		Entities		Profit margin		Turnover per employee (€m)		Profit per employee (€m)		Book effective tax rate		Cash effective tax rate	
			Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
EU		2,034	2,866	498	14.0	3.6	0.546	0.332	0.669	0.264	0.401	0.086	0.131	0.188	0.189	0.137
Non-EU		2,549	844	464	3.1	2.1	0.064	0.360	0.345	0.260	0.111	0.097	0.225	0.237	0.243	0.222
		4,583														
Tax havens	List 1 (L1)	498	250	161	5.4	3.0	0.571	0.566	0.959	0.434	0.568	0.159	0.118	0.151	0.165	0.162
Non-havens		4,085	1,392	520	5.0	2.0	0.092	0.320	0.319	0.233	0.111	0.085	0.208	0.231	0.239	0.207
		4,583														
Tax havens	List 2 (L2)	1,073	502	186	5.4	2.9	0.187	0.487	0.808	0.401	0.463	0.156	0.150	0.164	0.186	0.164
Non-havens		3,510	1,425	545	4.9	2.1	0.152	0.319	0.303	0.223	0.096	0.079	0.210	0.235	0.241	0.211
		4,583														
EU	Non-tax havens	1,843	3,137	537	14.1	3.8	0.562	0.306	0.432	0.261	0.156	0.084	0.141	0.199	0.193	0.139
	Tax havens (L1)	191	605	174	13.2	2.3	0.414	0.553	2.641	0.289	2.445	0.099	0.052	0.098	0.168	0.125
		2,034														
Non-EU	Non-tax havens	2,242	995	516	2.8	1.8	-0.029	0.324	0.290	0.225	0.099	0.085	0.231	0.242	0.255	0.230
	Tax havens (L1)	307	187	159	4.4	3.1	0.599	0.568	0.662	0.459	0.192	0.171	0.151	0.178	0.164	0.174
		2,549														
EU	Non-tax havens	1,593	3,337	592	14.5	3.7	0.893	0.292	0.376	0.246	0.100	0.074	0.147	0.204	0.190	0.145
	Tax havens (L2)	441	1,139	153	12.1	3.3	-0.724	0.479	1.744	0.330	1.506	0.130	0.074	0.129	0.187	0.109
		2,034														
Non-EU	Non-tax havens	1,917	973	533	2.7	1.8	-0.029	0.326	0.285	0.218	0.095	0.080	0.229	0.245	0.259	0.233
	Tax havens (L2)	632	343	194	4.2	2.9	0.415	0.489	0.574	0.419	0.179	0.163	0.195	0.184	0.186	0.183
		2,549														

Table 3.7: Distribution of key CBCR disclosure items by tax haven

This table presents the distribution of key disclosure items by tax haven for the top 15 tax havens. Amounts presented are averages over the 2013-2016 period. The home country activities of banks headquartered in Cyprus, Ireland, and Netherlands have been treated as non-tax haven activities.

	Bermuda	Cayman Islands	Channel Islands	Cyprus	Hong Kong	Ireland	Isle of Man	Latvia	Luxembourg
Turnover	€237m	€45m	€1,839m	€311m	€18,258m	€3,971m	€361m	€460m	€11,041m
% Tax havens	0.5%	0.1%	3.6%	0.6%	35.5%	7.7%	0.7%	0.9%	21.5%
% All countries	0.0%	0.0%	0.3%	0.0%	2.8%	0.6%	0.1%	0.1%	1.7%
Profit/loss before tax	€89m	€213m	€1,020m	(€135m)	€7,186m	€811m	€198m	€180m	€5,081m
% Tax havens	0.6%	1.3%	6.3%	(0.8%)	44.5%	5.0%	1.2%	1.1%	31.4%
% All countries	0.1%	0.2%	1.2%	(0.2%)	8.2%	0.9%	0.2%	0.2%	5.8%
Employees	458	38	3,775	1,307	43,830	7,537	1,038	3,723	15,460
% Tax havens	0.4%	0.0%	3.0%	1.0%	34.8%	6.0%	0.8%	3.0%	12.3%
% All countries	0.0%	0.0%	0.1%	0.0%	1.6%	0.3%	0.0%	0.1%	0.6%
Entities	33	283	317	84	210	456	47	12	586
% Tax havens	1.1%	9.8%	11.0%	2.9%	7.3%	15.8%	1.6%	0.4%	20.3%
% All countries	0.2%	1.8%	2.0%	0.5%	1.3%	2.8%	0.3%	0.1%	3.6%

	Malta	Mauritius	Monaco	Netherlands	Singapore	Switzerland	Other tax havens	Total Tax havens	Total All countries
Turnover	€230m	€475m	€643m	€1,608m	€7,174m	€3,495m	€1,271m	€51,419m	€655,297m
% Tax havens	0.4%	0.9%	1.3%	3.1%	14.0%	6.8%	2.5%	100.0%	-
% All countries	0.0%	0.1%	0.1%	0.2%	1.1%	0.5%	0.2%	7.8%	-
Profit/loss before tax	€129m	€343m	€191m	(€29m)	€1,323m	(€816m)	€375m	€16,160m	€87,451m
% Tax havens	0.8%	2.1%	1.2%	(0.2%)	8.2%	(5.0%)	2.3%	100.0%	-
% All countries	0.1%	0.4%	0.2%	(0.0%)	1.5%	(0.9%)	0.4%	18.5%	-
Employees	998	1,892	1,717	4,029	23,285	9,599	7,4229	126,105	2,768,498
% Tax havens	0.8%	1.5%	1.4%	3.2%	18.5%	7.6%	5.9%	100.0%	-
% All countries	0.0%	0.1%	0.1%	0.1%	0.8%	0.3%	0.3%	4.6%	-
Entities	37	37	19	265	142	99	256	2,881	16,131
% Tax havens	1.3%	1.3%	0.7%	9.2%	4.9%	3.4%	8.9%	100.0%	-
% All countries	0.2%	0.2%	0.1%	1.6%	0.9%	0.6%	1.6%	17.9%	-

Table 3.8: Tests of profit shifting indicators between tax havens and non-tax havens

This table reports the means of the profit shifting indicators and the difference in means between tax havens and non-tax havens. Statistics are provided for unconditional means and means conditional upon tax haven use. All variables are defined in Appendix C. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Profit margin	Tax haven	Obs.	Total	Tax haven	Non-tax haven	Difference	*t*-stat	*p*-value
Unconditional means	List 1	222	0.130	0.313	0.122	0.190***	4.26	0.000
	List 2	222	0.130	0.236	0.119	0.117***	2.68	0.008
Conditional means	List 1	149	0.109	0.466	0.097	0.369***	6.36	0.000
	List 2	173	0.131	0.303	0.117	0.186***	3.55	0.001

Panel B: Turnover per employee	Tax haven	Obs.	Total	Tax haven	Non-tax haven	Difference	*t*-stat	*p*-value
Unconditional means	List 1	260	0.336	0.502	0.333	0.170***	3.10	0.000
	List 2	260	0.336	0.490	0.329	0.161***	3.34	0.001
Conditional means	List 1	172	0.295	0.759	0.289	0.470***	6.81	0.000
	List 2	202	0.333	0.631	0.324	0.307***	5.44	0.000

Panel C: Profit per employee	Tax haven	Obs.	Total	Tax haven	Non-tax haven	Difference	*t*-stat	*p*-value
Unconditional means	List 1	221	0.057	0.243	0.054	0.189***	4.85	0.000
	List 2	221	0.057	0.242	0.051	0.191***	3.90	0.000
Conditional means	List 1	142	0.057	0.379	0.052	0.326***	5.70	0.000
	List 2	166	0.061	0.322	0.053	0.269***	4.21	0.000

Panel D: Book effective tax rate	Tax haven	Obs.	Total	Tax haven	Non-tax haven	Difference	*t*-stat	*p*-value
Unconditional means	List 1	185	0.222	0.102	0.226	-0.124***	4.48	0.000
	List 2	185	0.222	0.129	0.228	-0.099***	3.54	0.001
Conditional means	List 1	113	0.230	0.168	0.236	-0.068*	1.74	0.085
	List 2	134	0.225	0.178	0.232	-0.054	1.61	0.111

Panel E: Cash effective rate	Tax haven	Obs.	Total	Tax haven	Non-tax haven	Difference	*t*-stat	*p*-value
Unconditional means	List 1	50	0.139	0.035	0.138	-0.104*	1.94	0.058
	List 2	50	0.139	0.084	0.176	-0.092*	1.74	0.087
Conditional means	List 1	27	0.116	0.064	0.115	-0.051	0.77	0.451
	List 2	36	0.108	0.117	0.159	-0.042	0.86	0.397

Table 3.9: Geographic segment reporting and the implementation of CBCR (Number of geographic segments)

This table reports the results from estimating Equations (1) and (2) from 2012 to 2016 via OLS. The dependent variable is NUM_GEO_SEG. All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Dep. Var.	NUM_GEO_SEG				
	EU Banks		EU Insurers		EU Banks vs. EU Insurers
Variables	(1)	(2)	(3)	(4)	(5)
POST	-0.164	-0.100	0.060	-0.038	-
	(0.607)	(0.677)	(0.925)	(0.936)	-
EU_BANK	-	-	-	-	-2.361***
	-	-	-	-	(0.000)
EU_BANK*POST	-	-	-	-	-0.140
	-	-	-	-	(0.814)
SIZE	-	0.533**	-	0.410*	0.526***
	-	(0.018)	-	(0.096)	(0.000)
ROA	-	-6.652	-	3.959	-7.116
	-	(0.629)	-	(0.733)	(0.313)
LEV	-	-0.661	-	-6.864**	-8.673***
	-	(0.880)	-	(0.024)	(0.000)
REVGRTH	-	-0.541	-	-0.703*	-0.781**
	-	(0.567)	-	(0.077)	(0.041)
NUM_CTRY_ENT	-	0.090***	-	0.001	0.072***
	-	(0.000)	-	(0.963)	(0.000)
Intercept	4.136***	-6.780*	5.026***	1.737	2.930
	(0.000)	(0.097)	(0.000)	(0.657)	(0.253)
Country fixed effects	N	Y	N	Y	Y
Year fixed effects	N	N	N	N	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y
Observations	350	350	195	195	545
Adj. R^2	0.000	0.518	0.000	0.477	0.382

Table 3.10: Geographic segment reporting and the implementation of CBCR (Number of country segments)

This table reports the results from estimating Equations (1) and (2) from 2012 to 2016 via OLS. The dependent variable is NUM_CTRY_SEG. All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Dep. Var.	NUM_CTRY_SEG				
	EU Banks		EU Insurers		EU Banks vs. EU Insurers
Variables	(1)	(2)	(3)	(4)	(5)
POST	-0.057	0.000	-0.013	-0.088	-
	(0.815)	(0.999)	(0.981)	(0.839)	-
EU_BANK	-	-	-	-	-2.707***
	-	-	-	-	(0.000)
EU_BANK*POST	-	-	-	-	0.087
	-	-	-	-	(0.865)
SIZE	-	0.180	-	0.178	0.312**
	-	(0.352)	-	(0.327)	(0.013)
ROA	-	4.284	-	-9.876	-14.092***
	-	(0.730)	-	(0.118)	(0.003
LEV	-	3.275	-	-0.377	-2.106
	-	(0.278)	-	(0.841)	(0.105)
REVGRTH	-	-0.377	-	-0.579*	-0.725**
	-	(0.544)	-	(0.055)	(0.017)
NUM_CTRY_ENT	-	0.040***	-	-0.016	0.025**
	-	(0.001)	-	(0.376)	(0.023)
Intercept	2.029***	-4.639	2.910***	1.189	-0.172
	(0.000)	(0.177)	(0.000)	(0.676)	(0.930)
Country fixed effects	N	Y	N	Y	Y
Year fixed effects	N	N	N	N	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y
Observations	350	350	195	195	545
Adj. R^2	0.000	0.423	0.000	0.408	0.292

Table 3.11: Geographic segment reporting and the implementation of CBCR (Number of geographic line items)

This table reports the results from estimating Equations (1) and (2) from 2012 to 2016 via OLS. The dependent variable is NUMITEMS_GEO_SEG. All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Dep. Var.	NUMITEMS_GEO_SEG				
	EU Banks		EU Insurers		EU Banks vs. EU Insurers
Variables	(1)	(2)	(3)	(4)	(5)
POST	0.236	-1.795	1.607	0.710	-
	(0.883)	(0.187)	(0.640)	(0.791)	-
EU_BANK	-	-	-	-	-14.224***
	-	-	-	-	(0.000)
EU_BANK*POST	-	-	-	-	-1.172
	-	-	-	-	(0.731)
SIZE	-	-0.551	-	5.247***	4.133***
	-	(0.585)	-	(0.000)	(0.000)
ROA	-	220.068***	-	51.403	2.106
	-	(0.010)	-	(0.362)	(0.959)
LEV	-	-131.349***	-	-36.920***	-41.531***
	-	(0.000)	-	(0.006)	(0.000)
REVGRTH	-	0.632	-	-3.101	-1.917
	-	(0.892)	-	(0.393)	(0.541)
NUM_CTRY_ENT	-	0.178***	-	-0.052	-0.046
	-	(0.004)	-	(0.548)	(0.337)
Intercept	11.721***	164.164***	17.436***	-47.479**	10.318
	(0.000)	(0.000)	(0.000)	(0.011)	(0.402)
Country fixed effects	N	Y	N	Y	Y
Year fixed effects	N	N	N	N	Y
Bootstrapped standard errors	Y	Y	Y	Y	Y
Observations	350	350	195	195	545
Adj. R^2	0.000	0.379	0.000	0.367	0.278

Table 3.12: Geographic aggregation and tax haven intensity (NOMATCH_MAT)

This table reports the results from estimating Equations (3) and (4) from 2013 to 2016 via TOBIT. The dependent variable is NOMATCH_MAT_10 or NOMATCH_MAT_5. All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, using two-tailed tests.

Dep. Var.	NOMATCH_MAT_10		NOMATCH_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_PBT	1.233**	1.492*	0.840**	1.007**
	(0.028)	(0.054)	(0.011)	(0.016)
UNLISTED	-	0.503**	-	0.456***
		(0.046)		(0.002)
UNLISTED*THAV_PBT	-	-0.492	-	-0.214
		(0.807)		(0.835)
SIZE	-0.049	-0.131	0.047	-0.030
	(0.702)	(0.364)	(0.571)	(0.741)
ROA	-16.155	-14.993	-14.397*	-13.378*
	(0.201)	(0.236)	(0.053)	(0.061)
LEV	-2.930	-1.430	-2.601	-1.226
	(0.430)	(0.696)	(0.326)	(0.589)
INTANG	-1.502	7.568	-8.801	-1.905
	(0.943)	(0.722)	(0.528)	(0.891)
CAPINT	70.090***	70.798***	43.629***	43.868***
	(0.005)	(0.008)	(0.003)	(0.005)
REVGRTH	0.875*	0.927*	0.482	0.553**
	(0.089)	(0.077)	(0.137)	(0.047)
ΔTLCF	-82.593	-90.313	-45.425	-50.333
	(0.278)	(0.248)	(0.320)	(0.230)
TLCF_DUM	-0.605	-0.507	-0.206	-0.113
	(0.102)	(0.201)	(0.338)	(0.615)
NUM_CTRY_ENT	-0.005	0.001	-0.007*	-0.002
	(0.541)	(0.950)	(0.087)	(0.616)
Intercept	2.945	2.885	1.034	1.046
	(0.345)	(0.334)	(0.656)	(0.619)
THAV_PBT + UNLISTED*THAV_PBT	-	1.000	-	0.792
		(0.582)		(0.388)
χ^2-test	-	0.30	-	0.75
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	222	222	222	222
Pseudo R^2	0.303	0.314	0.372	0.399

Table 3.13: Geographic aggregation and tax haven intensity (LEVEL_MAT)

This table reports the results from estimating Equations (3) and (4) from 2013 to 2016 via OLS. The dependent variable is LEVEL_MAT_10 or LEVEL_MAT_5. All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Dep. Var.	LEVEL_MAT_10		LEVEL_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_PBT	2.204**	1.754	1.995**	1.644
	(0.014)	(0.110)	(0.015)	(0.104)
UNLISTED	-	0.386	-	0.653***
		(0.132)		(0.008)
UNLISTED*THAV_PBT	-	1.635	-	1.475
		(0.473)		(0.458)
SIZE	-0.145	-0.191	-0.087	-0.177
	(0.282)	(0.230)	(0.536)	(0.253)
ROA	-14.574	-14.136	-19.111	-18.119
	(0.258)	(0.275)	(0.148)	(0.157)
LEV	-0.474	0.275	-1.949	-0.484
	(0.918)	(0.953)	(0.658)	(0.913)
INTANG	-9.170	-4.671	-19.753	-11.839
	(0.712)	(0.855)	(0.430)	(0.629)
CAPINT	78.497***	77.758***	70.643***	71.235***
	(0.002)	(0.002)	(0.002)	(0.003)
REVGRTH	0.804	0.959*	0.723	0.929*
	(0.155)	(0.091)	(0.148)	(0.067)
ΔTLCF	-49.943	-54.672	-64.822	-72.726
	(0.516)	(0.480)	(0.376)	(0.317)
TLCF_DUM	-0.465	-0.392	-0.351	-0.232
	(0.115)	(0.204)	(0.239)	(0.411)
NUM_CTRY_ENT	-0.029***	-0.024**	-0.028***	-0.021**
	(0.002)	(0.027)	(0.001)	(0.027)
Intercept	3.838	3.942	4.023	4.187
	(0.337)	(0.295)	(0.325)	(0.293)
THAV_PBT + UNLISTED*THAV_PBT	-	3.390*	-	3.120*
		(0.077)		(0.065)
χ^2-test	-	3.13	-	3.40
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	222	222	222	222
Adj. R^2	0.454	0.462	0.432	0.455

Table 3.14: Geographic aggregation and tax haven intensity (THAV_PBT ≠ 0)

This table reports the results from estimating Equations (3) and (4) from 2013 to 2016 via TOBIT (Panel A) and OLS (Panel B). The dependent variable is NOMATCH_MAT_10 or NOMATCH_MAT_5 (Panel A) and LEVEL_MAT_10 or LEVEL_MAT_5 (Panel B). All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A

Dep. Var.	NOMATCH_MAT_10		NOMATCH_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_PBT	1.454**	1.145	0.922***	0.790**
	(0.010)	(0.121)	(0.007)	(0.035)
UNLISTED	-	-0.092	-	0.134
		(0.745)		(0.352)
UNLISTED*THAV_PBT	-	1.183	-	0.596
		(0.470)		(0.530)
Intercept	-1.026	-1.453	-2.487	-2.683
	(0.848)	(0.812)	(0.499)	(0.491)
THAV_PBT + UNLISTED*THAV_PBT	-	2.328	-	1.385
		(0.105)		(0.106)
χ^2-test	-	2.62	-	2.62
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	150	150	150	150
Pseudo R^2	0.278	0.281	0.412	0.424

Panel B

Dep. Var.	LEVEL_MAT_10		LEVEL_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_PBT	2.535***	1.689	2.340**	1.613
	(0.006)	(0.123)	(0.012)	(0.143)
UNLISTED	-	-0.007	-	0.356
		(0.984)		(0.257)
UNLISTED*THAV_PBT	-	2.808	-	2.456
		(0.228)		(0.248)
Intercept	-3.344	-4.226	-3.242	-4.039
	(0.602)	(0.537)	(0.598)	(0.557)
THAV_PBT + UNLISTED*THAV_PBT	-	4.497**	-	4.069**
		(0.027)		(0.018)
χ^2-test	-	4.87	-	5.56
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	150	150	150	150
Adj. R^2	0.374	0.380	0.351	0.370

Table 3.15: Geographic aggregation & tax haven intensity (Above/below median)

This table reports the results from estimating Equation (3) from 2013 to 2016 via TOBIT (Panel A) and OLS (Panel B). The dependent variable is NOMATCH_MAT_10 or NOMATCH_MAT_5 (Panel A) and LEVEL_MAT_10 or LEVEL_MAT_5 (Panel B). All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A

Dep. Var.	NOMATCH_MAT_10		NOMATCH_MAT_5	
	THAV_PBT		*THAV_PBT*	
	>median	*<=median*	*>median*	*<=median*
Variables	(1)	(2)	(3)	(4)
THAV_PBT	1.335	-1.545	0.922**	-0.228
	(0.105)	(0.827)	(0.023)	(0.974)
Intercept	-4.083	10.907	-4.161	8.451
	(0.600)	(0.131)	(0.451)	(0.134)
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	107	115	107	115
Pseudo R^2	0.360	0.387	0.566	0.412

Panel B

Dep. Var.	LEVEL_MAT_10		LEVEL_MAT_5	
	THAV_PBT		*THAV_PBT*	
	>median	*<=median*	*>median*	*<=median*
Variables	(1)	(2)	(3)	(4)
THAV_PBT	2.760**	-3.239	2.673**	-3.899
	(0.020)	(0.518)	(0.017)	(0.487)
Intercept	-5.814	15.322***	-4.990	15.256***
	(0.574)	(0.001)	(0.667)	(0.004)
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	107	115	107	115
Adj. R^2	0.442	0.577	0.415	0.554

Table 3.16: Analysis of 'Other' category in CBCRs

This table reports analysis of the 'Other' category used by firms in CBCRs. Significant differences in the means and medians (Panel C) are based on two-sided *t*-tests and Wilcoxon median tests, respectively. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix C.

Panel A: Proportion of 'Other' category to category total

	Turnover	Profit/loss before tax	Income tax expense	Income tax paid (cash)	Employees	Entities	Total
Mean	1.2%	-13.4%*	1.6%	1.9%	1.1%	5.3%#	-2.2%
Median	0.2%	0.1%	0.7%	1.1%	0.3%	5.3%#	0.4%

*Reduces to -1.3% if one observation is excluded (profit before tax recognised in 'Other' of (€195m) represented 850% of the total for 2014 of (€23m).

#Reflects one observation where 2 entities of a total of 38 were classified as 'Other'.

Panel B: Countries included within the 'Other' category

Rank	Countries (Number of observations)
1	Luxembourg (8)
2	United Kingdom (6)
=3	British Virgin Islands (5), Cayman Islands (5), China (5), Netherlands (5), Russia (5)
=8	Finland (4), Ukraine (4), Denmark (4), Switzerland (4), Brazil (4), Hong Kong (4), Mozambique (4), and South Africa (4)

Panel C: Use of 'Other' category in CBCR and intensity of tax haven use

Tax haven intensity	Firms using 'Other' category			Firms not using 'Other' category			Difference	
	Observations	Mean	Median	Observations	Mean	Median	Mean	Median
THAV_TO	84	0.015	0.000	177	0.023	0.011	-0.008**	-0.011***
THAV_PBT	72	0.045	0.000	150	0.042	0.009	0.002	-0.009
THAV_ENT	84	0.105	0.079	196	0.101	0.061	0.004	0.018

Table 3.17: Geographic aggregation and tax haven intensity (THAV_ENT)

This table reports the results from estimating Equations (3) and (4) from 2013 to 2016 via TOBIT (Panel A) and OLS (Panel B). The dependent variable is NOMATCH_MAT_10 or NOMATCH_MAT_5 (Panel A) and LEVEL_MAT_10 or LEVEL_MAT_5 (Panel B). All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A

Dep. Var.	NOMATCH_MAT_10		NOMATCH_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_ENT	1.988**	2.191*	0.951*	1.290*
	(0.013)	(0.094)	(0.050	(0.093)
UNLISTED	-	0.400	-	0.436**
		(0.198)		(0.014)
UNLISTED*THAV_ENT	-	-0.027	-	-0.159
		(0.988)		(0.874)
Intercept	-0.492	-0.548	-0.006	0.020
	(0.887)	(0.869)	(0.998)	(0.992)
THAV_ENT + UNLISTED*THAV_ENT	-	2.165**	-	1.131*
		(0.049)		(0.081)
χ^2-test	-	3.88	-	3.05
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	261	261	261	261
Pseudo R^2	0.268	0.274	0.343	0.365

Panel B

Dep. Var.	LEVEL_MAT_10		LEVEL_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_ENT	1.680**	1.367	1.353*	1.850*
	(0.035)	(0.238)	(0.093)	(0.097)
UNLISTED	-	0.310	-	0.721***
		(0.225)		(0.003)
UNLISTED*THAV_ENT	-	0.450	-	-0.651
		(0.763)		(0.653)
Intercept	-0.097	0.048	1.311	1.513
	(0.979)	(0.989)	(0.734)	(0.679)
THAV_ENT + UNLISTED*THAV_ENT	-	1.818*	-	1.199
		(0.085)		(0.234)
χ^2-test	-	2.96	-	1.41
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	261	261	261	261
Adj. R^2	0.407	0.409	0.397	0.413

Table 3.18: Geographic aggregation and tax haven intensity (THAV_ENT ≠ 0)

This table reports the results from estimating Equations (3) and (4) from 2013 to 2016 via TOBIT (Panel A) and OLS (Panel B). The dependent variable is NOMATCH_MAT_10 or NOMATCH_MAT_5 (Panel A) and LEVEL_MAT_10 or LEVEL_MAT_5 (Panel B). All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A

Dep. Var.	NOMATCH_MAT_10		NOMATCH_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_ENT	2.143***	2.271*	1.034**	1.277**
	(0.006)	(0.063)	(0.017)	(0.049)
UNLISTED	-	0.373	-	0.402***
		(0.218)		(0.005)
UNLISTED*THAV_ENT	-	0.104	-	-0.041
		(0.947)		(0.963)
Intercept	-2.516	-2.7532	-1.502	-1.613
	(0.497)	(0.449)	(0.489)	(0.420)
THAV_ENT + UNLISTED*THAV_ENT	-	2.375**	-	1.236*
		(0.016)		(0.061)
χ^2-test	-	5.78	-	3.51
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	238	238	238	238
Pseudo R^2	0.256	0.264	0.366	0.395

Panel B

Dep. Var.	LEVEL_MAT_10		LEVEL_MAT_5	
Variables	(1)	(2)	(3)	(4)
THAV_ENT	2.246***	1.857	1.852**	2.247*
	(0.007)	(0.145)	(0.028)	(0.075)
UNLISTED	-	0.322	-	0.752***
		(0.242)		(0.003)
UNLISTED*THAV_ENT	-	0.512	-	-0.579
		(0.742)		(0.712)
Intercept	-4.548	-4.469	-2.725	-2.829
	(0.296)	(0.284)	(0.532)	(0.543)
THAV_ENT + UNLISTED*THAV_ENT	-	2.369**	-	1.668*
		(0.025)		(0.099)
χ^2-test	-	5.01	-	2.72
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	238	238	238	238
Adj. R^2	0.395	0.398	0.398	0.420

Table 3.19: Geographic aggregation & tax haven intensity (Above/below median)

This table reports the results from estimating Equations (3) and (4) from 2013 to 2016 via TOBIT (Panel A) and OLS (Panel B). The dependent variable is NOMATCH_MAT_10 or NOMATCH_MAT_5 (Panel A) and LEVEL_MAT_10 or LEVEL_MAT_5 (Panel B). All variables are defined in Appendix C. Coefficient estimates are presented with the *p*-values reported in parentheses. *p*-values are based on bootstrapped standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A

Dep. Var.	NOMATCH_MAT_10		NOMATCH_MAT_5	
	THAV_ENT		*THAV_ENT*	
	>median	*<=median*	*>median*	*<=median*
Variables	(1)	(2)	(3)	(4)
THAV_ENT	2.998**	-7.073	1.389**	1.961
	(0.023)	(0.459)	(0.028)	(0.661)
Intercept	-9.808	5.562	-9.690*	5.556
	(0.331)	(0.611)	(0.088)	(0.295)
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	134	127	134	127
Pseudo R^2	0.331	0.398	0.528	0.375

Panel B

Dep. Var.	LEVEL_MAT_10		LEVEL_MAT_5	
	THAV_ENT		*THAV_ENT*	
	>median	*<=median*	*>median*	*<=median*
Variables	(1)	(2)	(3)	(4)
THAV_ENT	3.526***	-6.506	3.127***	-0.246
	(0.007)	(0.367)	(0.008)	(0.974)
Intercept	-15.748**	4.396	-15.594**	7.369
	(0.043)	(0.598)	(0.042)	(0.312)
Controls	Y	Y	Y	Y
Year & country fixed effects	Y	Y	Y	Y
Bootstrapped standard errors	Y	Y	Y	Y
Observations	134	127	134	127
Adj. R^2	0.430	0.530	0.500	0.460

3.10 Appendix A: Example segment note & CBCR

Panel A: Segment reporting note

» 52. Geographical and business segment reporting

Business segment reporting is a basic tool used for monitoring and managing the Group's various activities.

a) Geographical segments

This primary level of segmentation, which is based on the Group's management structure, comprises five segments: four operating areas plus the corporate center. The operating areas, which include all the business activities carried on therein by the Group, are: Continental Europe, the United Kingdom, Latin America and the United States, based on the location of the Group's assets.

The Continental Europe area encompasses all the business activities carried on in the region. The United Kingdom area includes the business activities carried on by the various Group units and branches with a presence in the UK. The Latin America area includes all the financial activities carried on by the Group through its banks and subsidiaries in the region. The United States area includes the holding company (SHUSA) and the businesses of Santander Bank, Santander Consumer USA, Banco Santander Puerto Rico, Banco Santander International's specialised unit and the New York branch.

The corporate center segment includes the centralised management business relating to financial investments, financial management of the structural currency position, within the remit of the Group's corporate asset and liability management committee, and management of liquidity and equity through issues.

The financial information of each reportable segment is prepared by aggregating the figures for the Group's various business units. The basic information used for segment reporting comprises the accounting data of the legal units composing each segment and the data available in the management information systems. All segment financial statements have been prepared on a basis consistent with the accounting policies used by the Group.

Consequently, the sum of the various segment income statements is equal to the consolidated income statement. With regard to the balance sheet, due to the required segregation of the various business units (included in a single consolidated balance sheet), the amounts lent and borrowed between the units are shown as increases in the assets and liabilities of each business. These amounts relating to intra-Group liquidity are eliminated and are shown in the Intra-Group eliminations column in the table below in order to reconcile the amounts contributed by each business unit to the consolidated Group's balance sheet.

There are no customers located in areas other than those in which the Group's assets are located that generate income exceeding 10% of gross income.

The condensed balance sheets and income statements of the various geographical segments are as follows:

(Condensed) 2016 income statement
Millions of euros

	Continental Europe	United Kingdom	Latin America	United States	Corporate center	Total
Net interest income	**8,161**	**4,405**	**13,345**	**5,917**	**(739)**	**31,089**
Income from equity instruments	272	1	78	30	32	413
Share of results of entities accounted for using the equity method	168	16	309	2	(51)	444
Net fee and commission income (expense)	3,497	1,031	4,581	1,102	(31)	10,180
Other income*	818	319	806	22	136	2,101
Other operating income (expenses)	(110)	44	(355)	460	(34)	5
Gross income	**12,806**	**5,816**	**18,764**	**7,533**	**(687)**	**44,232**
Administrative expenses and depreciation	(6,781)	(2,967)	(7,692)	(3,197)	(464)	(21,101)
Provisions or reversal of provisions	(444)	(276)	(800)	(72)	(916)	(2,508)
Impairment losses on financial assets	(1,383)	(58)	(4,912)	(3,187)	(86)	(9,626)
Profit from operations	**4,198**	**2,515**	**5,360**	**1,077**	**(2,153)**	**10,997**
Impairment losses on other assets	(36)	(64)	(42)	(35)	37	(140)
Other income and charges	(150)	1	59	(6)	7	(89)
Profit before tax	**4,012**	**2,452**	**5,377**	**1,036**	**(2,109)**	**10,768**
Income tax	(1,083)	(736)	(1,363)	(355)	255	(3,282)
Profit for the year from continuing operations	**2,929**	**1,716**	**4,014**	**681**	**(1,854)**	**7,486**
Profit (loss) from discontinued operations	-	-	-	-	-	-
Consolidated profit for the year	**2,929**	**1,716**	**4,014**	**681**	**(1,854)**	**7,486**
Attributable to non-controlling interests	330	36	628	286	2	1,282
Profit attributable to the parent	**2,599**	**1,680**	**3,386**	**395**	**(1,856)**	**6,204**

* Includes Gain or losses on financial assets and liabilities not measured at fair value through profit or loss, net, Gain or losses on financial assets and liabilities held for trading, net, Gain or losses on financial assets and liabilities measured at fair value through profit or loss, net and exchanges differences, net.

Panel B: CBCR

	2016			
Jurisdiction	Turnover (millions of euros)	Employees	Gross profit or loss before tax (millions of euros)	Tax on profit or loss (millions of euros)
Germany	1,537	4,792	505	15
Argentina	1,320	7,774	461	91
Australia	4	6	1	-
Austria	142	373	63	10
The Bahamas	(5)	43	(20)	-
Belgium	87	170	51	5
Brazil[1]	11,222	45,245	2,796	1,133
Canada	38	186	6	2
Chile	2,434	11,996	941	163
China	64	214	(7)	(1)
Colombia	12	94	-	1
Spain[2]	4,967	28,976	(821)	(114)
United States[3]	7,368	15,621	995	(122)
Denmark	145	215	77	21
Finland	92	148	56	17
France	495	897	266	109
Hungary	-	21	-	-
Ireland	69	6	40	-
Isle of Man	6	18	3	(1)
Cayman Islands	(1)	-	(1)	-
Italy	381	834	165	(1)
Jersey	(42)	486	(45)	1
Luxemburg	3	-	3	-
Malta	3	-	3	-
Mexico[4]	3,350	17,735	1,119	473
Norway	326	491	158	32
The Netherlands	88	269	45	36
Panama	6	5	5	-
Paraguay	-	-	-	-
Peru	53	151	26	9
Poland	1,682	14,610	703	236
Portugal[5]	1,322	6,898	591	79
Puerto Rico	349	1,559	(11)	16
United Kingdom	6,104	24,107	2,362	622
Singapore	3	12	(2)	1
Sweden	159	317	67	3
Switzerland	103	205	42	12
Uruguay	346	1,674	125	24
Consolidated Group total	44,232	186,148	10,768	2,872

1. Including the information relating to a branch in the Cayman Islands the profits of which are taxed in full in Brazil. The contribution of this branch profit before tax from continuing operations 2016 is EUR 347 million.
2. Includes the corporate center. During 2016, there have been tax refunds in relation to fiscal years 2014 and 2015, the latter in advance- ; so deducting its effect the amount of taxes paid would have been EUR: +175 million.
3. Tax accrued in the year in this jurisdiction amounted to approximately EUR 300 million due mainly to the difference in deferred taxes.
4. Including the information on a branch in the Bahamas the profits of which are taxed in full in Mexico. In 2016 the contribution of this branch to operating profit before tax from continuing operations was EUR 15 million.
5. Including the information relating to the branch in the UK, which is taxed both in the UK and in Portugal. In 2016 the contribution of this branch to profit before tax from continuing operations was EUR 84 million.

At 31 December 2016, the Group's return on assets (ROA) was 0.56%.

3.11 Appendix B: List of tax havens

List 1 includes 42 jurisdictions considered 'dot' tax havens. List 2 includes 54 tax havens per Dyreng et al. (2015). The 'Big 12' tax havens (populations > 1.6m) in List 2 are: Botswana, Costa Rica, Hong Kong, Ireland, Latvia, Lebanon, Liberia, Netherlands, Panama, Singapore, Switzerland and Uruguay.

Country	List 1	List 2	Country	List 1	List 2	Country	List 1	List 2	Country	List 1	List 2
Andorra	Y	Y	Cook Islands	Y	Y	Liechtenstein	Y	Y	Panama	-	Y
Anguilla	Y	Y	Costa Rica	-	Y	Luxembourg	Y	Y	Samoa	Y	Y
Antigua and Barbuda	Y	Y	Cyprus	Y	Y	Macao	Y	Y	San Marino	Y	Y
Aruba	Y	Y	Dominica	Y	Y	Maldives	Y	Y	Seychelles	Y	Y
Bahamas	Y	Y	Gibraltar	Y	Y	Malta	Y	Y	Singapore	-	Y
Bahrain	Y	Y	Grenada	Y	Y	Marshall Islands	Y	Y	St. Kitts and Nevis	Y	Y
Barbados	Y	Y	Guernsey	Y	Y	Mauritius	Y	Y	St. Lucia	Y	Y
Belize	Y	Y	Hong Kong	-	Y	Monaco	Y	Y	St. Vincent and Grenadines	Y	Y
Bermuda	Y	Y	Ireland	-	Y	Montserrat	Y	Y	Switzerland	-	Y
Botswana	-	Y	Isle of Man	Y	Y	Nauru	Y	Y	US Virgin Islands	Y	Y
British Virgin Is	Y	Y	Jersey	Y	Y	Netherlands	-	Y	Uruguay	-	Y
Brunei	Y	Y	Latvia	-	Y	Neth. Antilles	Y	Y	Vanuatu	Y	Y
Cape Verde	Y	Y	Lebanon	-	Y	Niue	Y	Y			
Cayman Islands	Y	Y	Liberia	-	Y	Palau	Y	Y			

3.12 Appendix C: Variable definitions

Variable name	Mnemonic	Definition
Geographic segments	GEO_SEG	Proportion of reporting segments based on geography
Number of geographic segments	NUM_GEO_SEG	Number of geographic segments disclosed in the segment reporting note
Number of country segments	NUM_CTRY_SEG	Number of country segments disclosed in the segment reporting note
Number of line items	NUMITEMS_GEO_SEG	Number of segment line items disclosed for each geographic segment
NOMATCH aggregation based on material countries	NOMATCH_MAT	Proportion of material countries in the CBCR not disclosed at the country level in geographic segment disclosures. A country is defined as material if it has disclosed turnover (TO) *or* profit/loss before tax (PBT) greater than 10% (NOMATCH_MAT_10) or 5% (NOMATCH_MAT_5) of the total TO or PBT
NOMATCH aggregation based on all countries	NOMATCH	Proportion of all countries in the CBCR not disclosed at the country level in geographic segment disclosures. Based on the disclosure of turnover (NOMATCH_TO) and entities (NOMATCH_ENT) in the CBCR
LEVEL aggregation based on material countries	LEVEL_MAT	Average aggregation score of material countries identified in the CBCR. Each material country receives an aggregation score based on its related geographic segment disclosure. A country is defined as material if it has disclosed TO *or* PBT greater than 10% or 5% of the total TO or PBT. Geographic segments are scored as follows: 0.0 = Countries (e.g., Germany) 0.5 = Aggregate countries (e.g., Germany/Austria) 1.0 = Subcontinents or aggregate countries/other (e.g., Western Europe or Germany/Austria/Other) 1.5 = Continents or aggregate subcontinents (e.g., Europe or Western Europe/Southeast Asia) 2.0 = Aggregate continents (e.g., Europe/Asia) 2.5 = Aggregate continents/other (e.g., Europe/Asia/Other) 3.0 = Major geographic regions (e.g., Northern hemisphere) 4.0 = All foreign/other (e.g., Foreign, Rest of World, International, Other)

Variable name	Mnemonic	Definition
LEVEL aggregation based on all countries	LEVEL	Average aggregation score of all countries in the CBCR. Each country receives an aggregation score based on its related geographic disclosure. Based on the disclosure of turnover (LEVEL_TO) and entities (LEVEL_ENT)
Weighted LEVEL aggregation	LEVEL_WT	Weighted measure of LEVEL that weights each country's aggregation score by the proportion of its turnover or entities to total turnover (LEVEL_TO_WT) or entities (LEVEL_ENT_WT)
Tax haven intensity	THAV	Ratio of activity disclosed in tax havens to total activity. Calculated based on turnover (THAV_TO), profit/loss before tax (THAV_PBT), and entities (THAV_ENT)
Treatment and control firms	EU_BANK	Dummy variable taking the value of 1 if a firm is an EU bank, and 0 if an EU insurer
Listing status	UNLISTED	Dummy variable taking the value of 1 if a firm is not listed on a public stock exchange, and 0 otherwise
Period after CBCR requirements	POST	Dummy variable for the period after the implementation of CBCR requirements in full: equals 1 for fiscal years after 2013, and 0 otherwise
Firm size	SIZE	Natural logarithm of total assets (after conversion to Euros using average exchange rates)
Profitability	ROA	Pre-tax income scaled by total assets
Leverage	LEV	Total liabilities scaled by total assets
Intangible assets	INTANG	Net intangible assets scaled total assets
Capital intensity	CAPINT	Net property, plant and equipment scaled by total assets
Revenue growth	REVGRTH	Change in total revenues from year *t*-1 to year *t* scaled by total revenues in year *t*-1
Change in tax losses carried forward	ΔTLCF	Change in the tax loss carried forward from year *t*-1 to year *t* scaled by total assets
Tax losses carried forward	TLCF_DUM	Dummy variable for tax losses carried forward; equals 1 if the tax loss carried forward is positive as at the beginning of the year, and 0 otherwise
Number of countries	NUM_CTRY_ENT	Total number of countries where the firm disclosed entities

Variable name	Mnemonic	Definition
Profit margin	PM	Profit/loss before tax divided by turnover
Turnover per employee	TPE	Turnover divided by number of employees
Profit per employee	PPE	Profit/loss before tax divided by number of employees
Book effective tax rate	BETR	Income tax expense divided by profit/loss before tax
Cash effective tax rate	CETR	Cash taxes paid divided by profit/loss before tax

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